ELECTRICAL REVIEW

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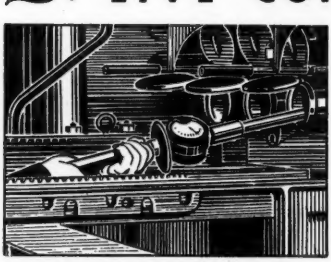

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

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24th DECEMBER, 1948

Power Plant Shortage

DRASTIC ACTION NEEDED

IT was an open secret that the provision of new generating plant was falling far short of the planned figure, which itself was quite inadequate. Nevertheless, Mr. Gaitskell's recent disclosure in the House of Commons that the net increase this year will amount to only 327,000 kW came as a shock to those not on the "inside." The new plant commissioned should have been at least 500,000 kW more than this and, to worsen the position, 200,000 kW of plant has had to be taken out for repair.

We have already expressed our dissatisfaction with the power plant aspect of the Government's economic policy which we consider gravely prejudices the nation's chances of recovery by the time it has to stand on its own feet. But we were justified in thinking that even this inadequate programme was backed by a determination to ensure its fulfilment. Events have shown that we were optimists. No doubt the Government will take refuge in pleading circumstances beyond its control, but those responsible for the power programme have repeatedly drawn attention to the obstacles which bar the way.

Planning and Amenities

The trouble starts immediately a new station or extension is projected. Planning authorities too frequently find that these stations do not fit into their schemes and other local bodies immediately raise their voices against interference with "amenities," which are often questionable. Months pass before a scheme goes through. As the uncertainty precludes the commencement of work in anticipation of approval, further delay occurs in the placing of contracts, particularly as the civil engineering works must be preceded by careful inspection of the final site to enable sound estimates to be presented. It is surely within the Government's power to exercise some measure of control where local interests are operating against national well-being.

Boiler House Erection

Although concurrently with the site clearance the design of the boiler house can be proceeded with, the installation of the pipework, which usually takes up to twelve months, cannot begin for a lengthy period. It is in this direction that a most serious obstacle exists. Boilermakers and steam-pipe manufacturers are finding it very difficult to obtain sufficient design staff and skilled erectors.

The latter trouble arises largely from the present immobility of labour, which affects many industries, and is caused principally by the housing shortage. Even if men can be persuaded to work away from their homes a large proportion do not stay on the site; the labour turnover figure is extremely high. The Government is employing methods of "direction" to get people into undermanned essential industries, of which this is one, but compulsion or semi-compulsion will not produce "stayers." Something more needs to be done to ensure a supply of suitable and willing workers.

Added to this is the continuing

scramble for steel by a number of industries claiming "priority" in which power station construction does not always fare as well as it should. At this time, when all industries depend upon a sufficient and reliable electricity supply, there can be no question of any one of them ranking higher than power stations in the allocation of steel. Electrical manufacturers appear to have overcome most of this difficulty and are generally keeping to their delivery dates. There may be occasional shortcomings but there have also been cases in which the installation of plant has been held up because the buildings have not been ready.

Consultation between all the interests involved in the provision of power plant is now frequent and regular, but little will be achieved without active Government assistance. There is as much urgency in this matter as there was in many others during the war, and only methods of getting things done similar to those employed in wartime will produce the necessary results.

OVERSEAS FACTORIES

THERE will be a great deal of sympathy with the view expressed by Mr. I. A. R. Stedeford (chairman) speaking at last week's annual meeting of Tube Investments, Ltd. He looked upon the erection of factories overseas by British manufacturers as the exportation of technical skill and experience which are now one of this country's few remaining assets. Mr. Stedeford said that to put up factories abroad before it was necessary to do so to preserve our trading interests was a poor substitute for the exporting of goods from our home factories and one which more often than not yielded only illusory gains to the ultimate consumer.

GAS TURBINE RESEARCH

A FACT of some significance that was mentioned, but not over-emphasized, in the thirteenth Parsons Memorial Lecture, which is briefly reported on page 1007, is the amount of diversity of research into and development of gas turbines that is proceeding in this country. Very little of this work owes anything to ideas which originated abroad. It will thus not be necessary, as the D.S.I.R. has pointed out, for British makers to seek manufacturing licences from foreign firms. Licences of this kind necessitate the paying of large fees out of the U.K. and cause improvements made by British licensees to become the property of licensors abroad. It is even possible in such circumstances that a licensee might have to pay fees for the use of improvements he has himself brought about. The prevention in this way of British improvements being properly credited to their originators is fortunately not likely to happen in the case of the gas turbine.

HOUSING POWER STAFFS

ONE of the difficulties which arise in connection with new power stations (as with other industries) is the provision of accommodation for the employees. The point cropped up at Kingston recently when a suggestion that workers at the new power station should be given preference in the allocation of Corporation houses met with local protests. Things are better at Stone (Staffs), for we hear that the Urban District Council has agreed to allot 52 houses on the Barlaston estate to people employed at Meaford. We still hold the view expressed in our issue of 15th October that power station contracts might include houses for those engaged in the stations.

I.E.E. BENEVOLENT FUND

IF each and every corporate member were fully aware of the comfort which the I.E.E. Benevolent Fund has given to those who have been helped by it, there would be no need for the president to make his annual appeal. Too much detail must not, for obvious reasons, be revealed, and one does not have to be reminded that it is the diminishing purchasing power of money which has caused I.E.E. subscriptions to rise. For exactly the same reason, the resources available to the Benevolent Fund must be enlarged if it is to continue to help as large a proportion of deserving cases as in the past.

SEASON'S GREETINGS

WE thank all those who have sent us their good wishes at this season and extend to all readers our hope that they will have a happy Christmas and greater prosperity during 1949.

Domestic cooker assembly showing the continuous flow on the production lines

New Appliance Factory

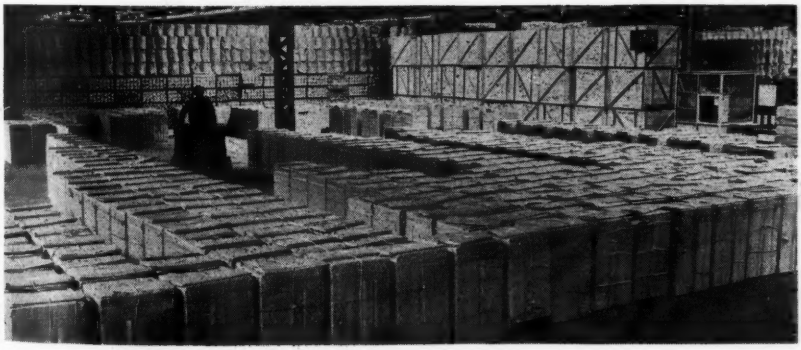
LARGE-SCALE MANUFACTURE AT BLYTHE BRIDGE

WITH the opening of its new factory at Blythe Bridge, Staffordshire, the Simplex Electric Co., Ltd., has established first-class facilities for the large-scale production of domestic electrical appliances. Erected during the war for the manufacture of aircraft, the factory has a floor area of almost 10 acres, all on one level and under a single roof in bays 650ft long. The 90-acre site on which the factory stands is in healthy rural surroundings with close proximity to Stafford and Stoke-on-Trent.

At present production is predominantly for export, though ample capacity is available to deal with the demands of the home market as well. The layout has been planned for a weekly output of 1,500 domestic cookers, 100 heavy-duty cookers and 2,000 water heaters, as well as various other "Creda" products. Up-to-date methods employed include the adoption of the continuous flow system of production throughout, with the use of the most modern machine tools, welding equipment and continuous conveyor vitreous enamelling plant and assembly lines.

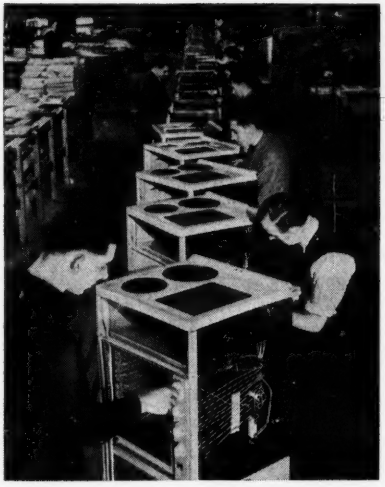
In the domestic cooker section attention is almost entirely concentrated on the quantity production of the new "Creda" "EV12" and "EV13" models. These two units, which are

Corner of the export despatch department of the new factory



identical except that the latter has (in addition to the grill boiler) two boiling plates instead of one, meet the needs of all normal families and have already been very well received abroad. The large oven heats up exceptionally quickly (to 400 deg. F in fourteen minutes) and a patented air ventilation and circulation system gives excellent uniformity of temperature throughout, the greatest difference in temperatures at various parts of the cooking space being only about 12 deg. That the heat loss is only 4 deg. F per min between 400 deg. F and 300 deg. F indicates the efficiency of the lagging.

The cooker, the normal export finish of which is white or two-tone ivory, can be used either as a free-standing model or built in and can be supplied either with a solid base or with a heated plate-warming drawer. "Credastat" automatic oven control is fitted as standard and there is a growing demand for the provision of "Simmerstats" instead of the standard 3- and 4-heat hotplate switches. All cookers are made for single-, two- or three-phase connections.



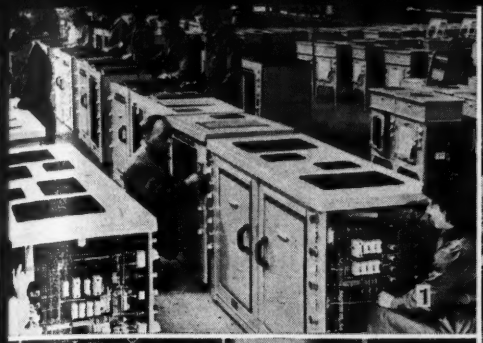
"Creda" cookers on final assembly conveyor. Inspection stages along the line form part of the assembly process

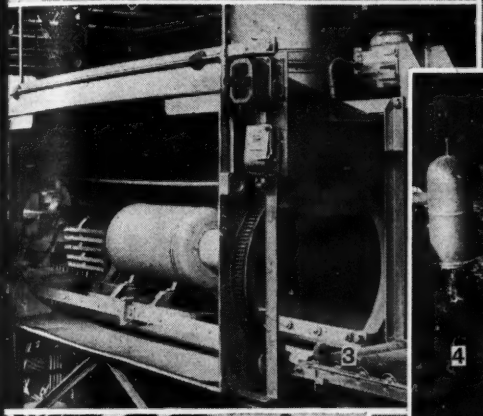
From the raw material stores at one end of the factory the various components are built up, gradually passing down and across the factory until they reach the finished component stores. Castings, after machining and annealing, are shot-blasted before being vitreous enamelled, and sheet metal components after fabrication go through pickling vats to remove rust and grease before their finish is applied by dipping or spraying. Hung on a continuous overhead conveyor these components then go to a continuous vitreous enamelling furnace 68ft in length capable of handling 2,000 sq ft of enamelled surface per hour. Articles pass gradually through a preheating zone until they reach the firing zone with a maximum temperature of 850 deg C and are then slowly cooled off. Large articles are dealt with in four large batch furnaces. After cooling, all items are inspected for flaws in the enamelling before going to the finished stores.

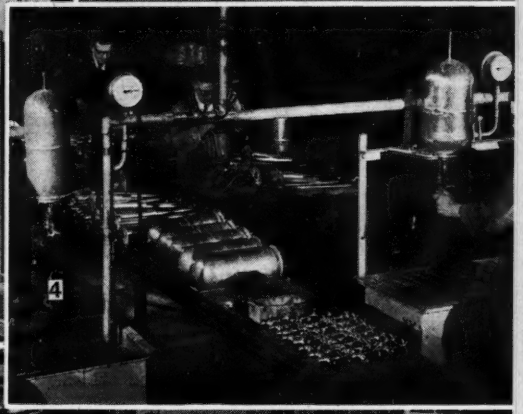
Final assembly is carried out on a conveyor system. The front frame of the cooker is assembled in a jig with the inner and outer oven liners in between which the thermal insulation is packed. The oven thermostat is added and the bodies are assembled, followed by the door fittings, hob section fittings, hob elements, the prefabricated wiring harness, door packing, door catch, oven fittings and a previously sub-assembled hob section. Sub-circuit fuses are employed as standard.

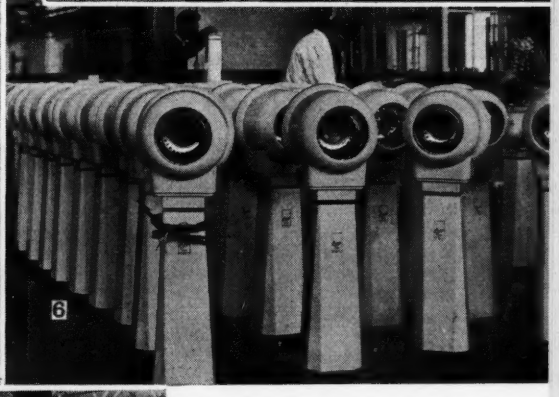
Recently a new type of grill has been incorporated. By using the minimum of ceramic material and by spacing the elements more closely at the sides than in the middle extra-rapid heating and even temperature all over the plate are secured. Since the cooker was first introduced other minor improvements in design have been made, most of them with the object of making the apparatus still more robust to withstand the maltreatment in handling to which exported goods are exposed. Furthermore, although the general design of the cookers makes them suitable for service in any part of the world, the company constantly incorporates special features to make them conform to local requirements and preferences.

Alongside the domestic cooker section are the commercial cooker production lines. Owing to the present varied nature









(1) Part of heavy-duty cooker section showing double-oven range being assembled. (2) Boiling-plate assembly line. (3) Rotating jigs facilitate the spraying of water heaters. (4) Pressure-testing water heater interiors. (5) Assembling "Electro-bloc" steam raisers. (6) Hand dryers ready for packing. (7) Part of an order for nearly 5,000 floodlights for a large oilfield

of the appliances made in the department the introduction of a conveyor system here is not yet practicable. Types of apparatus dealt with include restaurant ranges, steaming ovens, single-and-double-oven ranges, chef ranges, hot-cupboards, boiling tables and grillers.

Water-heater and wash-boiler production is also laid out to flow smoothly from one end of the factory to the other. After fabrication the sheet metal components go for protective treatment to an extensive and well-equipped plating and tinning section. Here in an area of 17,000 sq ft is plant for applying any of the many metal coatings now commonly adopted—cadmium, nickel, tin, zinc alloy, etc. Special rotating jigs have been provided to facilitate spray-painting.

Assembling 500-V 60-A triple-pole and neutral ironclad gear

The Simplex Electric Co. supplies a considerable number of storage electric water heaters for overseas territories. In most of these markets the water heater produced for the home market is generally found acceptable. There are, however, several countries with special water-heating regulations and requirements and to meet these home models have been adapted. The company has, for example, produced a special model of the 20-gallon D.P. water heater, having in mind the power shortage which applies in other countries besides Britain. In this the normal 500-W top element is eliminated and instead there is one permanently connected 200-W element (not thermostatically controlled) and four 200-W elements (thermostatically controlled) under time-switch control.

In a separate section of the factory the "Electrobloc" steam raiser sold in this country by J. W. Woolley & Co., Ltd., is being made under licence. This equipment, which is designed on a thermal storage principle, is, however, marketed in overseas territories by the Simplex Electric Co. through its world agency organization.

Following the acquisition of the new factory at Blythe Bridge the company has been able to relieve serious overcrowding of its two other main factories situated at Oldbury. One of these, freed from cooker and water heating production, has now been able to increase the production of other "Creda" domestic appliances, such as kettles, irons, fires (almost entirely for export), boiling plates, tubular sheathed elements for cookers and water heaters. In addition this factory is producing on mass production lines electrical accessories notably the new "Microta" 40-A switches for cooker controls, 13-A flat-pin sockets and fused plugs and a variety of other electrical accessories made on behalf of an associated company, A. P. Lundberg & Sons, Ltd. Another section of this factory is devoted to the production of industrial lighting fittings and hand dryers for use in factories and workshops.

At the other Oldbury works site production is concentrated on ironclad switch- and fuse-gear, ironclad plugs and sockets, cooker controls, flameproof switchgear and lighting fittings, floodlighting equipment and conduit and conduit fittings. The virtual ban on the export of steel conduit (which is greatly hampering the export of current-consuming appliances, since it is obviously no use obtaining the latter if there are no installations on which to use them) has created a considerable demand from abroad for aluminium conduit. Aluminium is also becoming increasingly

employed in metalclad switch- and fuse-gear. To supply the castings required in all three factories the Simplex Works is equipped with a fully mechanized foundry installation.

Among orders received recently are those for large quantities of cookers and water heaters for South Africa, Australia, Malaya, Rhodesia, Kenya, Tanganyika, West Indies, Eire and Iceland; tubular heaters for a large block of buildings in Oporto; installation equipment for a large restaurant at Cairo and an opera house in Turkey; installation gear for gold mines in Brazil, copper mines in Rhodesia, tin mines in West Africa and sugar plantations in the West Indies and Portuguese West Africa; nearly 5,000 floodlights for oilfield application throughout the world; and industrial lighting equipment for whaling vessels and oil tankers.

Taking the production of the company as a whole exports last year amounted to 315 per cent in volume and 800 per cent in value compared with the immediate pre-war figures. In addition there is a very considerable indirect export business which is difficult to measure in the shape of ancillary electrical components forming an essential part of electrical machinery of varying kinds exported by British manufacturers. The company has a very full overseas order book especially for electrical installation equipment but with the increased factory facilities and improved production methods outstanding orders are being rapidly executed and the company expects, in the near future, to give more rapid delivery.

Generation of Electricity

INCREASE OF 9.8 PER CENT IN NOVEMBER

STATISTICS issued by the Ministry of Fuel and Power show that 3,988 million kWh was generated during November, representing an increase of 9.8 per cent over the corresponding month of last year. This is approximately the same rate of increase as in the total for the eleven months of the year (9.6 per cent). Further details showing kWh sent out, plant capacity, fuel consumed, etc., are given in the accompanying table. With regard to installed capacity, the figures for November, 1948, are based on the following new definition: "Total capacity (m.c.r.) of all generating sets in the station (including auxiliary and stand-by sets) which are connected to the steam range or prime mover and to the busbars, and which are suitable for use. Scrap plant and any other plant which has been disconnected and written off but not actually removed from the station is excluded." It is estimated that this change has involved a reduction of about 7 MW in the November figures.

During the week ended 10th December the output from solid-fuel-fired stations amounted to 944.3 milllion kWh against 989.1 million in the preceding week, and 955.5 million in the week ended 12th December, 1947. Stocks of coal at electricity undertakings at 11th December aggregated 4,267,010 tons.

	Fuel consumed Thousand tons		kWh generated millions			kWh sent out millions	Installed capacity (m.c.r.) MW
	Coal	Oil	Steam	Water power	Total†		
British Electricity Authority	2,585	3.8	4,199	49	4,264	4,024	12,849
North of Scotland*	22	0.9	32	78	114	112	324
Total for November, 1948	2,607	4.7	4,231	127	4,378	4,136	13,173
Total for November, 1947	2,419	3.4	3,860	111	3,988	3,766	12,582
Per cent increase on 1947	7.8	38.2	9.6	14.4	9.8	9.8	4.7
Total January-November	25,128	37.0	40,478	1,208	41,839	39,465	—
Corresponding period of 1947	23,287	47.2	37,015	1,204	38,182	35,997	—
Per cent increase or decrease on 1947 ...	+7.9	−21.6	+9.4	+18.0	+9.6	+9.6	—

* Including North of Scotland Hydro-Electric Board and Lochaber Power Co.
† Including generation by other means amounting to 18.4 million kWh in October, 1948.

Views on the News

By REFLECTOR

ON several occasions I have referred to the cold comfort derivable from the knowledge that conditions in this country are paralleled in many ways by those in the better-placed United States. Thus, although the shortage of plant in the States is not so severe as it is here, it is a fact that they are running with a very small margin, put at 4 per cent, on the right side of demand. Again, as in Great Britain, building construction is lagging behind the production of generating plant. The *Electrical World* (New York) reports the case of turbine manufacturers who offered generating equipment to certain utilities some months ahead of schedule, but it could not be taken because the constructional work was not sufficiently advanced. The journal says: "Inability to speed up construction work is thwarting the speed-up which has been achieved in turbine manufacture."

* * *

It is the policy of the British Electricity Authority, as a public body, to encourage the public to take an interest in its operations. One way in which this is being fostered is the arranging of visits to power stations, and the latest manifestation of this activity—and a new one so far as I know—is an advertisement by the South-Eastern Division of British Electricity that the new Kingston station will be open to the public on six specified days between the hours of 2.30 and 5 p.m. To ensure manageable parties tickets of admission have to be asked for.

* * *

So much prominence is given these days to strikes, demands for shorter hours, and the like that we may be excused for wondering whether the "will to work" has been lost. I was particularly pleased, therefore, to be told of the very enthusiastic response to a "help at the bench" appeal at the Exide Works of the Chloride Co. In spite of overtime by factory employees, more production for export was needed, so the office staff was approached and within one day 175 had volunteered to work 2½ hours' overtime in the factory for two or three nights a week. I was impressed by the fact that the suggestion emanated not from the management, but from the branch secretary of the union at a Works Committee meeting.

* * *

If "Sorrow's crown of sorrows is remembering happier things," how sad the members of the J. & P. Staff Association must have felt when the chairman of the company, Mr. G. Leslie Wates, at the Association's recent annual dinner, detailed the menu for a dinner given to the staff in 1884 by the founders of the firm. There were giants in those days who were not affrighted by innumerable courses and an embarrassment of choice, with wines to match. I refrain from repeating to my austerity-governed readers the details of this Gargantuan feast which, I suppose, was then considered quite an ordinary affair.

* * *

The expedient of using mice to draw wire through conduit about which I wrote some time ago has, I learn, been further developed. A wiring job in New Zealand necessitated 600ft of cable being pulled through a maze of 4in glazed piping beneath the floors of a factory. Ordinarily this would have taken many weeks, but in this case the work was carried out in a single morning. The task was accomplished by calling in the aid of a pet ferret. An alluring scent of rabbit was blown into the far end of each pipe by a small compressor and the ferret, with 80ft of fishing line attached to its collar, was introduced at the other end. The result was speedy and effective.

* * *

A correspondent of the *Daily Graphic* contests a statement in that paper that the housewife does not need to be taught the urgency of saving electricity. He says he knows of a woman who, when using her electric cooker for "simmering," does not use a low or even medium current, but switches the cooker on full. Then, when she finds her food gets too hot, she puts three pennies under the saucepan so as to raise it off the hot plate.

Submersible Motors

Salient Points of Construction and Use

By K. W. JEROME,
Graduate I.E.E.

THE design of practical submersible motors has interested manufacturers for many years. They are employed mainly for driving underwater and borehole pumps and can be divided into two classes.

The "dry" type makes it necessary to reach an agreement with each pump manufacturer to provide an intermediate chamber between the pump and the motor of such a design that there is no danger of liquid leaking into the motor through the bearing housing. The windings must be treated with a waterproof impregnation so that there will not be an electrical breakdown in the event of accidental flooding, or through condensate collecting.

Bearings should be of stainless steel if there is a possibility of any leakage through the top bearing housing. The cable entry must also be designed so that entry of liquid into the motor cannot occur at this point. All joints should be of the hydraulic, or similar, type.

The greatest drawback to this design is the fact that as the motor manufacturers are dependent upon the efficiency of the pump makers' design, the consequential "divided responsibility" may arouse dissatisfaction.

Several makers have adopted this construction in a simple form, while others have provided additional equipment to eject any leakage water, or an alarm device to indicate at the surface when leakage has taken place. They include a "leakage" pump within the motor carcase which only operates when a predetermined amount of water is present, or the motor is installed in a diving bell and an air-compressor is provided to replenish the air in the bell, when necessary, from the surface through a pipe. Alternatively a compressor, at the surface, may be controlled by switches in the base of the motor which are operated when a certain amount of water has collected in the motor carcase.

In contrast, in the "wet" type of motor the liquid is free to circulate through and around the rotor, so that

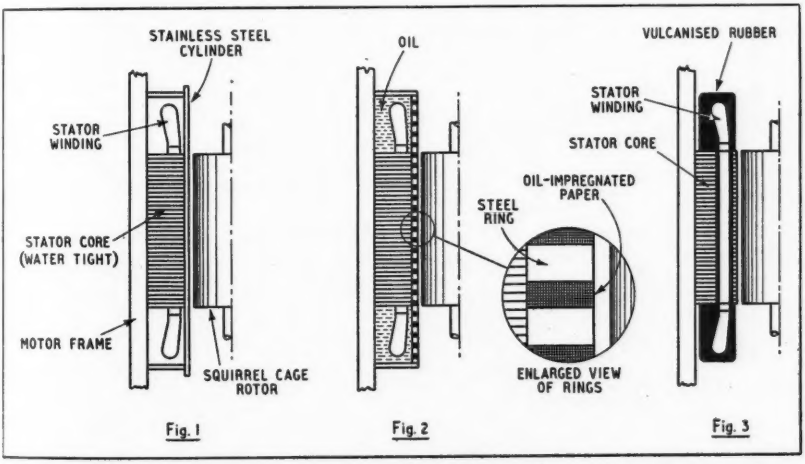


Fig. 1.—Steel cylinder enclosing stator windings. Fig. 2.—Paper and steel ring enclosure of stator. Fig. 3.—Rubber sealing of stator coils.

the problem of making the motor watertight changes to that of making the stator winding watertight. This type of motor appears to be the most popular.

The associated pump is usually of the small-diameter, high-speed impeller type. The motor may be mounted above or below the pump and is rigidly attached to it. As the combination has to pass down a narrow borehole, the obvious choice is a two-pole squirrel-cage motor, having a full-load speed of approximately 2,900 r.p.m. at 50 c/s with a frame of small overall diameter.

The fluid enters in an upward direction to the rising main, effectively cooling the motor in passing. The bearings may be of the rolling element type with a ball-bearing to take any thrust load (except in the case of large machines, which employ the Michell thrust-type bearing) or the sleeve type, which uses a material that can be lubricated by the liquid being pumped. Rolling and Michell bearings are efficiently lubricated by grease sealed into them.

Protecting Stator Windings

Several methods have been devised for protecting the stator windings. A cylinder up to about 3-mm thick, of non-magnetic stainless steel, is introduced between the rotor and stator in the air-gap and so arranged at the ends (Fig. 1) as to seal efficiently the stator windings against ingress of liquid. This method has several disadvantages, among which are appreciably reduced efficiency due to the increased losses in the air-gap and reduced power factor due to eddy losses in the cylinder.

For motors of large output the cylinder in the gap may be constructed of rings of high-quality electromagnetic steel and separated by oil-impregnated paper (Fig. 2), the stator enclosure being then filled with oil. The entire stator winding may be embedded in compound, but a method which is by far the most successful is to seal the stator coils in rubber. The stator laminations possess suitable closed slots which are lined by a special process with crude rubber. After the winding has been completed, the coil overhang is covered with a coating of crude rubber and, finally, the whole is compressed in a suitable press into one solid block (Fig. 3) and then vulcanized. Rubber has a relatively low permissible temperature rise, but the circulating fluid is an effective coolant.

The chief advantage claimed for a submersible motor is the elimination of the long lengths of shafting and bearings required between a motor installed at surface level and the borehole pump, with the attendant increased maintenance. There can be very little deviation from the vertical with shafting.

Long lengths of shafting cannot be run at 3,000 r.p.m. in a borehole and this results in a larger diameter pump for a more convenient lower speed. This, in turn, necessitates a larger borehole.

Duplicate pumps may be used in the same borehole. The necessity for costly buildings and foundations is removed and this type of motor pump is easily transportable.

Disadvantages are that the motor is difficult to construct, especially for large outputs when the overall diameter has to be small enough to pass down a borehole. Winding repairs also entail greater difficulty. The performance figures are not so good as those of a standard type of motor. The friction of the rotor in the fluid will naturally increase the losses and hence reduce the efficiency.

Applications of the submersible motor are many and varied, as may be instanced by water supply for works, mills, emergency supplies, etc.; de-watering of foundation sites, graving docks, etc.; fire-fighting; and agricultural water supplies.

Madras Distribution Schemes

THE Madras Government has sanctioned a scheme for constructing a 66-kV feeder from Papanassan to Tinnevelly and Kayattar at an estimated cost of Rs. 17.67 lakhs initially, rising to Rs. 18.17 lakhs in ten years. The line is intended to serve a cement factory and agricultural and other loads in the area. An estimate of Rs. 16.36 lakhs initially, rising to Rs. 21 lakhs in eight years, has also been sanctioned for the extension of a 66-kV line to Pollachi from Negamam, and for the construction of a 66/22-kV substation at Pollachi to meet the large load development anticipated in the Pollachi-Anamalai areas of the Pykara System. A third estimate sanctioned is for Rs. 29.55 lakhs initially, rising to Rs. 36.6 lakhs within five years, for a scheme for supplying 28 villages and towns in the West Godavari District.—*Reuters Trade Service* (New Delhi).

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Prince Regent of Belgium has conferred upon Sir Cyril Hurcomb, chairman of the British Transport Commission, the honour of appointment as Grand Officer of the Order of the Crown. Sir Cyril was Director General of the Ministry of War Transport during the last war and was closely associated with Belgian shipping. The decoration was presented last week by the Belgian Ambassador.

Mr. Douglas N. Dale, son of Mr. Victor W. Dale, secretary and business manager of the British Electrical Development Association, will, directly after Christmas, join the Joint Publicity Dept. of the International Refrigerator ("Coldrators") and Hotpoint companies which are subsidiaries of Associated Electrical Industries, Ltd. Since 1938 Mr. Dale has been a journalist on a number of newspapers and for the last three years he has also been North London correspondent of the Press Association and London daily papers. From the end of 1941 until his release in 1945, he served in the Radar Branch of the Royal Navy.

J. K. Bradley, M.B.E., A.M.I.E.E., the newly appointed chief engineer of Philco (Overseas), Ltd., has just returned from a short visit to the Engineering Department of the Philco Corporation in the United States. Mr. Bradley has been with Philco since 1937, except for the war years, during which he served in the Army.

Mr. C. W. Pellow, who has been to Australia as a special representative of the Benjamin Electric, Ltd., has returned to this country.

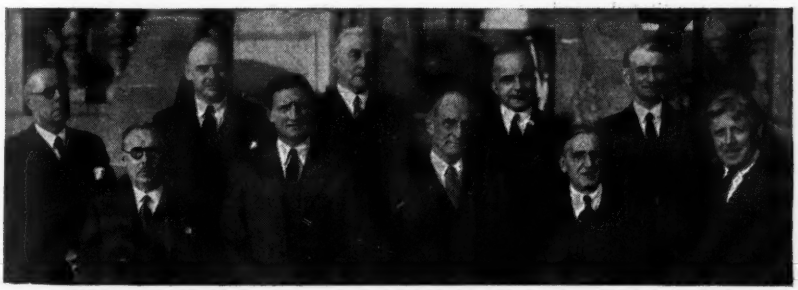
The chairman (Mr. H. Nimmo) and members of the **Southern Electricity Board** recently visited the No. 3 (Portsmouth) Sub-Area, when the accompanying photograph was taken. Mr. E. A. Logan, who is now district executive officer, Portsmouth, as mentioned in the inscription to our picture, recently retired from the position of chief electrical engineer and manager to the Burmese Government.

Mr. R. E. Cox, rolling stock superintendent with Newcastle-on-Tyne city transport undertaking, has been appointed deputy transport manager at Bolton at a salary of £850 per annum.

Mr. W. T. Hoy, A.M.I.E.E., lately assistant engineer with Kennedy & Donkin, consulting engineers, has taken up appointment in the Transmission Construction Dept., Headquarters, B.E.A.

Mr. C. O. Brettelle, who has just retired from the position of technical editor of the *Electrical Review* (although he remains on the board and is to act as technical consultant), was entertained at luncheon by his fellow editors of the electrical Press at the Holborn Restaurant on 17th December. On behalf of the editors, Mr. S. M. Hills, *Electrical Industries*, presented Mr. Brettelle with a case of pipes.

Mr. J. Andrew Lee, M.I.E.E., A.M.I.Mech.E., transmission construction engineer, British Electricity Authority, is relinquishing his appointment at the end of February. Mr. Lee was trained at the Ilford electricity works and subsequently joined the Stepney undertaking. During the 1914-18 war he served with the Royal Engineers and then became personal



Members of the Southern Electricity Board at Southsea. At the rear: Mr. D. S. Cumberlege, legal adviser; Mr. E. A. Logan, district executive officer, Portsmouth District; Major H. Richardson, member of Board; Mr. F. W. Kempton, secretary; and Ald. J. P. D. Lacey, member of Board. Front row: Mr. W. G. Turner, manager, No. 3 (Portsmouth) Sub-Area; Mr. R. B. Brown, deputy chairman; Mr. H. Nimmo, chairman; Mr. A. Lockwood, member of Board; and Professor H. G. Sanders, member of Board

assistant to the late Sir John Snell and was later a member of the engineering staff of the Electricity Commission. Then Mr. Lee became construction engineer to the Central Electricity Board and held that post until electricity vesting day. Mr. Lee was chairman of the Transmission Section of the Institution of Electrical Engineers for the 1946-47 session.

The B.E.A. is advertising for a successor to Mr. Lee at a salary of £2,000-£2,500 per annum.

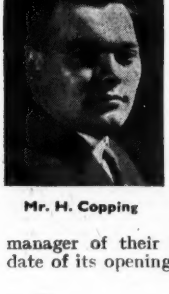
The many friends of **Mr. F. H. Williams**, chairman and managing director of the Jackson Electric Stove Co., Ltd., will wish him continued good health on his retirement on 1st January next.

Mr. Williams (with Messrs. T. & J. Jackson) founded the company in 1910 and was largely concerned with the pioneer and development work in electric cookery, to which he first directed his interest as long ago as 1899. **Mr. S. C. Hurry**, a director of the company, who has been responsible for all sales since 1922, joining the company in 1919, succeeds Mr. Williams as chairman and managing director.

Mr. E. Penn, secretary of the company, who has been connected with its activities for many years, becomes a director as from 1st January.

Mr. P. Tate has been appointed a director of F. H. Wheeler (Sheffield), Ltd. **Mr. A. Walters** and **Mr. C. Rees** are remaining on the reconstituted board.

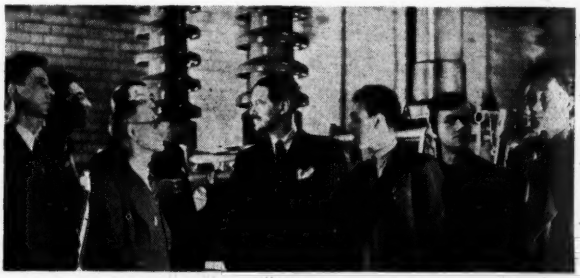
Mr. H. Copping, M.I.E.E., has been elected chairman of the Utilization Group of the North Midland Centre of the Institution of Electrical Engineers. Mr. Copping is a member of the Association of Mining Electrical and Mechanical Engineers and also of the Executive Committee of the Leeds Branch of the Incorporated Sales Managers' Association. He has been associated for many years with George Ellison, Ltd., and was manager of their Glasgow office from the date of its opening until 1938, when he was appointed to his present position of manager of the company's Leeds office.



Mr. H. Copping

Mr. W. M. Shakeshaft has been appointed managing director of Star Domestic Appliances, Ltd. Mr. Shakeshaft was for a number of years with Philips Electrical, Ltd. After five years in the Services he rejoined Philips for a short time before becoming general manager of Star Domestic Appliances, Ltd., in February, 1946.

A party, consisting of Professor A. Rushton, Messrs. D. W. Hopkin, H. E. Park, M. W. Humphrey Davies and twenty power engineering students of the City and Guilds College, London, recently visited the Research Department Laboratories of **British Insulated Callender's Cables, Ltd.**, at Wood Lane, Shepherds Bush. After a short talk by Dr. L. G. Brazier, manager (research) on the work of the company and the opportunities offered to the qualified engineer at home and overseas, a short film on the manufacture and testing of power cables was shown. The party was then divided into two groups and conducted round the laboratories, where many of the scientific developments associated with power cable manufacture and testing were explained and demonstrated.



Dr. L. G. Brazier (centre), manager (research), B. I. Callender's Cables, with City and Guilds students in the High Voltage Laboratory

The Reliance Telephone Co., Ltd., a subsidiary of the General Electric Co., Ltd., held its annual dinner and dance on 11th December at Lord's Hotel, St. John's Wood Road, N.W.8. Mr. E. Silberman, managing director, was in the chair, supported by Messrs. V. Amberg and W. T. Ashton, both members of the board. Several members of the staff entertained the company with songs.

For their Christmas pantomime this year the **G.E.C. Dramatic Society** presented "Ali Baba and the Naughty Thieves," devised and written by John Hurst, of the Government Railways Dept. A children's matinée on 18th December brought its six-day run in the Lecture Hall at Magnet

House to a very successful conclusion. A lively plot interspersed with eighteen musical numbers accompanied by two pianos and percussion gave the cast of twenty-nine plenty of scope for their songs and dances. The show was produced by Marian Naylor, and William Thompson was stage manager. The proceeds will go to the Countess of Clarendon's Appeal for Girl Guides' Clubs.

Following the recent annual general meeting of the **Watliff Co., Ltd.,** at the Criterion Restaurant there was a luncheon to shareholders, guests and customers.

Mr. W. Martin Hume, F.C.A., chairman, presided and referred to the achievements of the company since the war. Mr. W. E. Arnold, A.M.I.E.E., general manager, emphasized that productivity per man-hour had been greatly improved since 1945.

In our last issue we referred to the annual dinner-dance of the **Association of Electrical Machinery Traders.** We now reproduce a photograph taken at the reception.

The annual staff dinner and dance of **T. Clarke & Co., Ltd.,** was held at the Criterion Restaurant, London, on Saturday last. Sir Harold Moore, chairman of the company, presiding. Mr. A. J. Shrosbery, managing director, proposed the toast of the ladies and guests. Miss M. Saunders, chief of the lady clerks, responded for the ladies, and Mr. C. Masie (Walsall Conduits, Ltd.), replied for the guests.

Mr. G. Robinson, senior electrical engineer of the company, proposed the toast of the directors, and Sir Harold Moore, in reply, thanked the Social Committee and particularly Mr. C. H. Lowes for the successful arrangements of the evening. The company, he said, had been in existence for over sixty years, and he had been associated with it for over fifty years. Mr. P. H. Harman Jones, a director, proposed the toast of the employees, to which Mr. S. Charters responded.

Some of the long-service employees of the Accrington Corporation Electricity Department, now serving British Electricity, attended an informal supper recently as guests of the former chief, Mr. A. Goward.

To commemorate fifty years of public electricity service in Salisbury, a dinner was given by the **Southern Electricity Board** at the Guildhall, Salisbury, on 14th December, at which the district executive officer, Mr. R. A. McCulloch, presided. Among the guests present were Mr. H Nimmo, chairman of the Board, Mr. R. B. Brown, deputy chairman, Mr. A. J. Fippard, the Mayor of Salisbury (Clr. R. G. Gordon) and chief officials of the Council.

The **Phosphor Bronze Co., Ltd.,** recently held a luncheon at its new works, Bradford Street, Birmingham, 5, to enable the employees to see the new works. Forty-seven gold watches were presented to employees, including the joint managing directors, Messrs. G. T. Hyslop and W. Smithson, all of whom had over twenty-five years' service. Silver badges for over fifteen years' service and bronze badges for over ten years' service were also presented to 113 people.

Mr. L. Bowers (chairman), Mrs. Bowers, Mrs. Lawton and Mr. W. E. Lawton (president) at the A.E.M.T. dinner

Obituary

Mr. W. R. Watson, M.I.E.E., partner in Brian Colquhoun & Partners, civil engineers, died in Portugal on 15th December as a result of an accident. He was forty-seven years of age.

Mr. J. C. M. Craig.—The death occurred on 14th December, at Stafford, at the age of seventy, of Mr. J. C. M. Craig, who retired from the English Electric Co., Ltd.'s Stafford Works two years ago. Mr. Craig joined Siemens Bros. Works in 1906 and remained at the Stafford Works under the English Electric Co., Ltd., until the time of his retirement.

Mr. H. Thornton. — The death has occurred at the age of sixty-nine of Mr. H. Thornton, who was a special representative of the Benjamin Electric, Ltd., from 1939 to 1947, when he had a leg amputated and was in failing health from that time.

Industry and the House

Membership of Public Boards

By F. J. ERROLL,
M.A., A.M.I.E.E., M.P.

THE time is approaching when the Government's Economic Survey for 1949 should be appearing. The Survey for 1948 did not appear until February of this year, and there was some criticism of the delay. Major Bruce, Labour M.P. for Portsmouth, urged that such a Survey, if it was to be of value, should be published shortly before the commencement of the year to which it related. Otherwise by the time the report had been digested the year was well advanced.

At the moment of writing the Government has said nothing about the 1949 Survey. The Opposition does not attach much importance to these Surveys, but it is surprising that no Labour M.P.s should have referred to a 1949 Survey, or even asked when it will be published. The inaccuracies which characterize the 1948 Survey are nowhere more clearly brought out than in the field of electricity generating capacity.

Deficiency in Plant Programme

Mr. Robens, the Parliamentary Secretary to the Ministry of Fuel and Power, told the House that the estimate in the Survey for new capacity was 1,150,000 kW. In fact, only 453,000 kW had been brought into service by 30th November, although the total for the year was expected to exceed 500,000 kW. This is less than half the Survey's figure, and led to Mr. Dumpleton, Labour M.P. for St. Albans, and former mayor of that town, asking for an enquiry into the cause of the failure to reach the Government's target figure.

In his reply the Minister of Fuel and Power explained that the B.E.A. had already caried out a full enquiry:—"The main explanation is that the estimates in the Survey were too high, in the light of the capacity of the manufacturing industries concerned, their export commitments and shortage of skilled labour and materials." This explanation begs the whole question. The object of the Survey is to estimate the capacity of the industries concerned and to make full allowance for labour and material shortages. If these factors cannot be estimated reliably, there can be little point in the Survey.

The Standing Committee on the Steel Bill has completed seven sittings and finished its examination of only Clause 1 of the Bill. There was considerable discussion about membership of the new Iron and Steel Corporation. The antecedents of individuals chosen for other national boards came in for a good deal of critical examination and some hard things were said about retired generals, trade union leaders, and senior Civil Servants.

The publication on the 15th December of an up-to-date list of members of the boards of socialized industries is therefore timely. The list occupies eight full pages of Hansard and includes details of salaries and allowances. The British Electricity Authority occupies nearly three pages because the individuals comprising the Area Boards are included. In the case of the National Coal Board only the membership of the main Board is given. The reason for this difference is that the Area Electricity Boards are Ministerial appointments, whereas Divisional membership is decided by the National Coal Board and not by the Minister of Fuel and Power.

National Board Members

The oft-repeated allegation that nationalized Boards are a resting place for retired generals certainly cannot be substantiated in the case of the British Electricity Authority. An analysis of the ranks given in this list shows that apart from an engineer vice-admiral there is nobody carrying a higher rank than colonel, of which there are three. Lieutenant-colonels number two, and there are also two majors and four captains. There will be more names in the New Year, as the President of the Board of Trade hopes to announce the membership of the new Monopolies Commission early in January.

As readers will be aware, each Minister has his own day for answering questions. When a Minister reaches the top of the list he goes to the bottom of the list in the following week and so gradually works up to the top again. This means that there is a period of two or three weeks during which a Minister's questions are not reached orally and he is thus spared the embarrassment of supplementary questions. The Minister of Fuel and Power was in this fortunate position this week and he has not therefore had to deal with the question of shop-window lighting for Christmas and the lighting of Christmas trees, save by written answer.

The Postmaster-General has not been so fortunate. He was closely cross-examined by Members on both sides of the House in connection with the wage claim of the Post Office Engineering Union. This Union has hitherto refrained from circularizing M.P.s when discussing wage claims with the Minister. It feels so strongly about this claim that it has broken with the past—hence M.P.s' questions on the subject. Members asked for a Court of Enquiry, pointed out that many of the men were below a subsistence level, and implied that a number of men were leaving the telephone service. To all these points Mr. Paling replied that he did not want to say anything while negotiations were going on. Mr. Speaker had to silence supplementary questions by saying that the House was not the negotiating body.

There has been a great delay in publishing the compensation regulations required under Section 55 of the Electricity Act. The Minister hopes that draft regulations will be presented to Parliament after the Christmas recess. It is a fact that much of the delay has been caused by an attempt on the Government's part to evade some of the assurances which were given during the Committee Stage of the Bill by the previous Minister; only the watchfulness of the Opposition has prevented the issue of inadequate regulations.

PARLIAMENTARY NEWS

By Our Special Reporter

THE Minister of Fuel and Power was asked by Mr. Palmer in the House of Commons last week if he would give figures showing the extent of the gap between the maximum national electrical demand and the generating capacity available to meet it for the winters 1946-47 and 1947-48; and the estimated figures for the winters 1948-49 and 1949-50.

Mr. Robens, Parliamentary Secretary to the Ministry of Fuel and Power, said that the maximum gap between the estimated peak demand and the actual capacity available to meet it was about 2,000,000 kW in the winter of 1946-47 and rather over 1,000,000 kW in the winter of 1947-48, which was exceptionally mild. The maximum gap between demand and available capacity this winter would depend partly on the weather and partly on the effect of the measures taken to reduce peak demand, such as the differential tariff recommended by the Clow Committee. With average winter weather they thought it was unlikely that the gap would much exceed 1,000,000 kW, but if at any time the weather was exceptionally severe the gap might during such conditions be double that figure. He could not at present give any reliable estimate for next winter.

Mr. Palmer asked what was the programme figure for anticipated new electrical generating capacity in 1948, and the total capacity of new plant actually brought into service for the eleven months ended 30th November, 1948.

Mr. Robens said that the estimate given in the "Economic Survey for 1948" was 1,150,000 kW. It was now expected that over 500,000 kW would be commissioned in the year. In the eleven months ending 30th November 453,000 kW of new plant had been brought into service.

In reply to a further question regarding the estimated capacity of new electrical generating plant to be brought into service during 1949, Mr. Robens said it was extremely difficult to make accurate estimates of this kind owing to the number of unforeseeable contingencies, but it appeared from the information at present available that about 1,000,000 kW might be brought into service in 1949.

Compensation Regulations

Mr. J. Morrison asked the Minister of Fuel and Power what was the present state of the negotiations regarding the terms of the compensation regulations required under Section 55 of the Electricity Act;

and when it was likely that the negotiations would be concluded. Information on this point was also sought by Colonel Clarke.

Mr. Robens said that consultations were practically concluded and it was hoped that the draft Regulations would be laid when Parliament resumed after the Recess.

Electricity Poles

Mr. Vane asked the Minister of Fuel and Power why he maintained so strict a specification for poles for overhead transmission lines for electricity when, by using a specification more in line with that in force in Continental countries, more home-grown poles could be used, foreign exchange saved, and electricity schemes in rural areas speeded up; and if he would reconsider this question.

Mr. Gaitskell said that the British Standards Institution specifications for wooden poles for overhead lines were more stringent than Continental specifications but the Electricity Boards were working to a relaxed specification, which did not compare unfavourably with Continental practice. Electricity Boards used home-grown poles, but any extension of their use would involve a more widespread employment of spruce. Spruce had a tendency to break, split and twist, and while it could be used within specified dimensions according to the type of line, engineers only employed it to a limited extent, because of possible risk to the public and employees and because of the high cost of maintenance.

Electricity for Scottish Industries

Mr. MacLeod asked the Secretary of State for Scotland whether once sufficient profit was made by selling electricity to the B.E.A. to offset losses incurred by the Hydro-Electric Board for the uneconomic distribution to the rural areas, he would guarantee that power would be available at cost for major industries setting up in the Highlands.

Mr. Woodburn said the price regulations made by the Secretary of State under Section 10 of the Hydro-Electric Development (Scotland) Act, 1943, fixed the maximum prices to be charged by the Board for electricity supplied to ordinary consumers and provided that the prices to be charged to large power users as a whole should be sufficient to meet the cost of generating and transmitting the electricity supplied to them. Subject to these regulations the fixing of actual charges was a matter for the Board.

Fumes from Generating Stations

Mr. Bossom asked the Lord President of the Council if he was satisfied that the experiments which had been made to eliminate harmful results from the burning of coal and/or oil fuel in generating stations adjacent to other buildings had been successful, and would he lay before the House the report dealing with this matter.

Mr. Herbert Morrison said that the present methods of removing sulphur from flue gases of power stations, although effective, were costly and troublesome. The Department of Scientific and Industrial Research was trying to find methods of removal which, while equally effective, would be less costly and troublesome. The problem was not an easy one, and a quick remedy could not be expected. This work had not yet reached a stage where a report could usefully be made.

Television in Industry

ADVANCES which were likely to determine the trend of television development were the subject of a lecture delivered by Mr. D. Weighton to the Association of Supervising Electrical Engineers in London this week. The lecturer dealt more particularly with the uses of television systems for process control, industrial and commercial, as well as in research. Military applications exploited in Germany and the United States during the war represented the first large-scale use for purposes other than entertainment. Since 1945 the sphere had widened to include the remote observation of many dangerous phenomena and the dissemination of pictorial information for educational and other purposes. Some of those applications were described and it was suggested that in the future they might rank equal in importance in entertainment.

In television receiver design there had not recently been a single discovery of major importance. Advances in camera tube design were described with particular reference to the manner in which performance had been improved and the possibilities of higher definition and colour television were discussed briefly.

Transport Scholarship and Grants

THE Council of the Institute of Transport is inviting applications from persons engaged in, or intending to be engaged in, road transport within the North-Western Region for the award in August, 1949, of one Sir William Chamberlain Memorial Scholarship of value not exceeding £50, and up to seven Sir William Chamberlain Memorial Grants not exceeding £10 each. Applications must be made not later than 31st May, 1949, on a form to be obtained from the Secretary, The Institute of Transport, 80, Portland Place, London, W.1.

Power Transmission

PROBLEMS SURVEYED IN E.P.E.A. LECTURE

IN a "Survey of High-Voltage Transmission Problems" presented before the London Technical Group of the Electrical Power Engineers' Association on 14th December, DR. J. S. FORREST stated the limiting factors as current density, voltage drop and system stability.

The first was based on heating of the conductors in still air at 20 deg C (68 deg F), which for the 0.175 sq in (copper equivalent) s.c.a. lines of the 132-kV British grid gave about 90 MVA. Permissible voltage drop was obtainable from circle diagrams which showed the effect of power factor; thus for a 10 per cent drop the MVA-miles at 85 per cent lagging p.f. were less than half the number at unity p.f. Stability limit was set by the voltage squared divided by the reactance of the lines, but depended on characteristics of the lines and generators and the performance of protective gear, so that for the grid a theoretical 16,000 MW-miles was reduced to 8,000 to give a working power limit that allowed for operation contingencies such as short-circuits.

Use of D.C.

While transmission by d.c. offered theoretical advantages, converters from a.c. to d.c. and vice versa were not yet available in large enough units and would be costly. In addition d.c. switching and the amount of reactive power necessary presented as yet unsolved problems. In Sweden, where power would be transmitted 600 miles, a.c. at 380 kV was to be employed, but d.c. investigations were being continued. Dr. Forrest put the scope for d.c. provisionally at not less than 100,000 MW-miles.

Air temperatures in Great Britain varied normally from 0 to 100 deg F with solar radiation up to 120 deg, but peak levels were apt to occur when temperatures were lowest, increasing generally by 1 per cent per deg drop in temperature. Temperature changes were responsible for ageing of insulators and voltage distribution between units on the same string was found to vary from 20 to 100 per cent. Describing research at the Croydon testing station of the B.E.A., he mentioned that the amount of atmospheric impurity deposited in the London area as 200 tons per sq mile per annum. Live washing of insulators needed to be carried out almost continuously to be effective.

Surges due to surface leakage on insulators, resulting in flashovers, were pronounced in humid industrial or seaside districts, though rain itself was cleansing. Semi-conducting glazes, already used for sealing ends, would avoid surges, but certain difficulties in making connections had still to be overcome before they could be used for insulators of the cap-and-pin type. Humidity or fog also affected the amount of interference with wireless reception, which was generated at the insulators and transmitted along the line; in any case, however, it was not troublesome more than 50 yards away.

Wind and Snow

Wind gusts might reach 100 m.p.h. and 40 to 70 m.p.h. was often experienced at the top of the 80ft grid towers. These could set up sustained oscillations often leading to fatigue fracture but for the Stockbridge dampers fitted. Corrosion of the conductors at joints, due to electrolysis, was another trouble, the current taking a path through steel cores instead of through the aluminium. Snow falls on an average on thirteen days a year in the London area, compared with thirty-eight days in Buxton. It was usually dangerous only in combination with ice; this condition had caused ten major breakdowns in twenty years, which could not economically be prevented in this country.

Lightning caused 40 per cent of faults on the grid, or one per 100 miles per annum at 132 kV against four at 33 kV, owing to the lower insulating level of the latter. Both sets of conductors of double-circuit lines were involved on an average in one strike out of four with 132 kV lines as against one out of two (owing to closer spacing) with 33 kV lines.

In nine cases out of ten supply could be restored immediately, so automatic reclosure promised good results. About 20-cycles interval was required, however, to dissipate ionized gas. Double earth wires gave much more than proportionate protection against lightning. About 80 per cent of the grid towers had resistances to earth of less than 10 ohms.

The lecture ended with cinematograph illustrations of live-line testing and rupturing of arcs at 132 kV. The load-carrying capacity and voltage drop permissible for 400 V to 264 kV systems can be readily ascertained from "Overhead-Line Charts," by Dr. J. S. Forrest. (Electrical Review, Ltd., at 2s 6d).

Anglo-Russian Trade

AT the annual meeting of the Russo-British Chamber of Commerce last week the presidential address was read by Mr. A. G. Marshall (member of the Executive Council) in the absence of Sir Greville Maginness.

It was mentioned in the address that although good progress had been made with certain shipments under the 1947 trade agreement, disappointing progress had been made in the conclusion of the contracts envisaged in Article 3A for the supply to the Soviet Union of the machinery and equipment shown in two schedules. Although tenders had been submitted by British manufacturers to the Soviet Trade Delegation for almost the whole of the scheduled requirements, contracts concluded under the agreement even now only amounted to about £3 million, or slightly above 15 per cent of the total.

Apart from the question of prices, which had been affected by a Soviet aversion to a price variation clause, perhaps the greatest difficulty encountered in the conclusion of contracts had been the Soviet insistence on the inclusion of a cancellation clause in the event of late delivery even for goods which were not of standard manufacture. It had been impossible for firms in this country to accept such terms. It was to be hoped that by continued negotiations those difficulties might eventually be overcome. The main items for which contracts had already been signed included 210 excavators, 150 mobile Diesel electric generators, 24 transportable steam turbine power stations, and woodworking machinery.

There had, however, been a welcome tendency for the trade between the two countries to overflow the narrow confines set by the agreement. So far as exports from this country were concerned, contracts had been concluded for the supply of a very large quantity of Diesel engines, Diesel-electric generating sets and ancillary equipment over and above that scheduled in the agreement, apart from other items.

U.K. Long-Term Programme

AN expenditure of about £500 million on the installation of thermal generating plant to increase the available generating capacity by about 40-50 per cent above the present amount is provided for in the British four-year programme submitted to the Organization for European Economic Co-operation in September and published on Monday as a White Paper ("European Co-operation," H.M. Stationery Office, 1s 3d). The figure mentioned includes ancillary work on transmission lines and distribution, but in addition over 600MW of hydro-electric capacity will be installed in the North of Scotland, much of which will supply industrial needs in Scotland and make possible new developments in the Highlands.

In 1949-50 the gross capital expenditure on generating stations, transmission lines and distribution works will be between £100 million and £125 million. A large programme for increasing capacity is already in hand, and this is regarded as particularly important in connection with plans for increasing industrial output and productivity. This programme has now reached a critical stage of the work, since the very large building and civil engineering works must be carefully geared in with the installation of the boilers and turbo-alternators. To do this a special effort is called for in 1949-50.

Chancellor's Statement

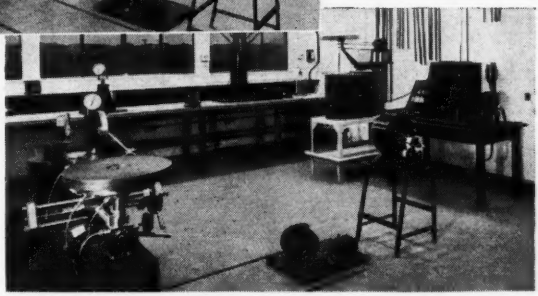
Explaining the 1949-53 programme at a Press Conference on Monday, Sir Stafford Cripps, Chancellor of the Exchequer, stated that the programme assumed that the expansion would be sufficient to provide for an increase in the volume of exports to at least 50 per cent above 1938 (rather more than 10 per cent above 1948); capital investment at the rate of about £2,000 million a year; and a 15-20 per cent increase in the supply of manufactured goods to the home consumer and a substantial increase in supplies of home-grown food to replace imports. It was hoped to increase industrial output as a whole by one-third over the pre-war level: this assumed that we could raise productivity per man-year by about 2½ per cent, which was by no means impracticable. The plan was not intended to be a rigid one, but a definition of general objectives. Given a reasonable level of commercial lending by the United States it was hoped by 1952-53 to have a surplus of £100 million in the balance of payments.

Steam Testing

NEW POWER STATION LABORATORY

THE following notes relate to some of the more interesting equipment installed in the new steam test laboratory which has been established by the North Eastern Division of the British Electricity Authority at Dunston power station.

The new building has been designed to accommodate the steam testing staff with test laboratories, workshops and all the apparatus necessary for carrying out steam plant tests in the Division. It covers a ground area of 3,000 sq ft. On the ground floor are arranged the mechanical and hydraulic laboratory, a workshop, stores, and a ventilating-plant room, while the upper floor is devoted to technical staff offices, records and filing rooms, an electrical research laboratory and a "dark" room. All the rooms are air-conditioned with electric heating under thermostatic control, and special attention has been given to the lighting of the laboratories and workshops.



(Above) Hand and motor operated vacuum pumps for gauge testing are a feature of the mechanical laboratories

(Right) A salt-bath is installed for high-temperature thermometer and pyrometer testing

Water-flow measuring equipment is the main feature of the mechanical laboratory. Under the floor is sunk a large tank holding about 3,000 gallons of water. A motor-driven pump draws the water from this tank and delivers it to a head tank at the top of the building, from which the water flows down to the test mains, through venturi tubes, meters, etc., to a large cylindrical measuring tank. Finally the water is drained back to the underground tank. As the measuring tank is calibrated in two half sections a test can be run continuously for any duration. The maximum rate of flow is about 150,000 lb/hr. Venturi tubes and meters of larger sizes are dealt with in the main power station test lines. A Bailey deadweight gauge tester is used for testing pressure gauges over a range of 0 to 1,200 lb/sq in. in 5 lb steps, or for supplying a measured internal pressure to any vessel or apparatus. For pressure-gauge calibration the gauge readings are compared against deadweights, each weight exerting a definite pressure on the floating piston. The pressure is equalized by forcing oil through the system until the deadweight and floating piston

is lifted off its seat. The weights are then rotated slowly to overcome friction.

An extra-high-pressure deadweight gauge tester is similar to the medium-pressure tester previously described, except that it has ranges of 0 to 1,500 lb/sq in and 25 to 15,000 lb/sq in. Pressure is applied hydraulically, using oil as the working fluid, and two floating pistons are provided, one for each range. For testing vacuum and compound gauges there is a hand vacuum pump. The gauge readings are compared against a standard mercury column. The maximum suction obtained with the hand pump is about 26in Hg (bar. 30in Hg).

A double-acting, motor-driven vacuum pump (to be installed) is capable of producing a higher vacuum than the hand-operated pump, and it will produce a vacuum of 29in Hg (bar. 30in Hg). For sampling and determining the amount of CO_2 in boiler flue gases the mechanical laboratory equipment also includes a flue-gas analyser. The gases are drawn from the boiler and passed through a caustic potash solution which absorbs the carbon dioxide. The change in volume is recorded on a chart, the value being indicated as a direct percentage of the total gases. There is also standard "Orsat" apparatus for measuring percentages of CO_2.

In the electrical laboratory is installed a heating cabinet (left) specially designed for heating tests on instruments

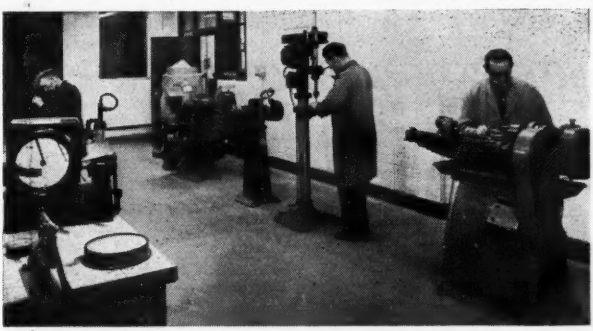
For calibrating turbine tachometers and speed counters a stroboscopic speed tester is used. The tachometers are coupled to a stroboscopic disc which is driven by a variable-speed motor. The disc is illuminated by neon lamps which are energized from the 50-cycle supply or from a standard tuning fork.

A salt bath for high-temperature thermometer and pyrometer testing consists of two cylindrical steel tanks interconnected at the top and bottom. One tank contains the tubes into which are inserted the thermometers and pyrometers, and the other tank is used for heating the mixture of potassium nitrate and sodium nitrate salts. The melting point of the salt mixture is about 450 deg F, so that the bath cannot be used for temperatures below this value. The maximum range is 1,100 deg F. A motor-driven stirrer helps to provide rapid circulation of the salts when the temperature is above 450 deg F melting point. The heating side is rather unusual in that the two walls of the heating tank form short-circuited turns on the secondary side of a large transformer, and the heating is controlled by varying the input to the primary side of the transformer. Power-factor correction is effected by a special compensating coil on the bath side of the transformer. With steady electrical input and with the stirrer in operation, the bath temperature gradient is less than a fraction of 1 deg F.

In an oil bath for calibration of medium-temperature thermometers oil is circulated between the outer and inner chambers of a cylindrical metal tank, and the temperature is controlled by electrically heating the walls of the outer chamber. The thermometers to be tested are placed in a special cradle which is supported over the inner chamber. An electrically driven pump draws the hot oil from the outer chamber and delivers it to the bottom of the inner chamber when it rises to the top and overflows back to the outer chamber. This arrangement ensures a very small temperature gradient in the inner chamber. A tachograph is used to measure percentage variations in speed from a given basic value, and it can be adapted for any basic speed by fitting various sizes of pulleys. The chart speed can be

varied to suit requirements, the time base being marked on the chart by a perforator or a marking needle. The marking needle is attached to an electro-magnet in series with a "Synchronome" clock.

The workshop equipment includes a "Myford" precision screw cutting lathe with 3.5in centres and a 28in long bed; a "Corona" pedestal drilling machine with overhead variable-speed drive and a balanced adjustable table; a pedestal double-ended grinding machine with window guards (speed 2,860 r.p.m.); a buffing and polishing machine with a special exhauster fan (speed 2,860 r.p.m.);



The workshop houses a comprehensive range of machine tools

a "Pultra" watch-maker's lathe which is capable of turning and polishing the most delicate parts of clockwork and instrument mechanisms; and a fume cabinet for cleaning and purifying mercury. When using acid solutions the vapour can be drawn off at the top of the fume cabinet and discharged through a "Vent-Axia" fan.

The store room houses venturi tubes, pipe units, heavy apparatus and instruments used in connection with test work, and special racks are provided for storing steam-pressure gauges and smaller dial instruments. The Keith Blackman air-conditioning installation in the ventilating plant room is designed to afford five to six complete changes of air per hour. Air is drawn through a special filter and delivered to the various rooms and workshops through ducting, and the fan duty is 4,500 cu ft per minute.

A special feature of the electrical laboratory is the interlinking of the various benches, tables and permanent testing apparatus by concealed cables. A special heating cabinet is designed for carrying out heating tests on electrical instruments and apparatus which may be affected by large variations of ambient temperature. In certain cases boiler house and engine room temperatures may vary by as much as 80 to 100 deg F. The walls of the cabinet are about 2in. thick, the space between the inner and outer metal plates being filled with asbestos material. The maximum temperature obtainable with full heating is about 300 deg F. Permanent connections are taken through to the cabinet terminal board from the centre bench so that measurements can be made without opening the door and thus lowering the temperature. A large double plate glass window is fitted for observation.

Also in the electrical laboratory is a Wild-Barfield thermometer testing bath which consists of an electric furnace into which can be inserted various metals and salts with known melting points. Thermometers, thermocouples and other temperature measuring apparatus can be standardized at the definite melting points, or compared with N.P.L. standards in a special container. Special N.P.L. type calibrated open-scale thermometers are used for calibration and standardizing purposes.

A chronograph is used for recording acceleration, sequence operation and timing of any action where a high degree of accuracy is required. It consists of a motor-driven chart which can be run at varying speeds, and six ink pens trace the timing of various operations. One pen gives a time base marked in 1/10th second intervals, and by subdivision readings to 1/100th second can be made.

Finally, a vibrograph is used for measuring vibration on machinery and structures. The actual movement or displacement caused by vibration is transmitted through the needle to a stylo pen

which traces the vibratory movement on to a celluloid strip. The celluloid strip is rotated by clockwork. In addition to the curve traced by the vibration pen, an additional mark is impressed on the celluloid strip by an electrically operated pen in series with a high-speed time-switch. This forms the time base for the vibration record. The amplitude of vibration as traced on the celluloid strip is seven times that of the actual movement. Further magnification of the record is obtained by placing the celluloid strip into a viewer which has a total magnification value of 70. Photographic records can be taken by interchanging the glass screen with a dark slide and using the viewer as an enlarger.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Lift Safety

I AM grateful to your correspondents for their interest and suggestions regarding my article on the subject of lift safety.

Mr. W. S. Forster Brown's proposal has the merit of simplicity, but I favour breaking the main current so as to prevent power movement in either direction irrespective of any combination of faults in the lift equipment. In spite of Mr. L. G. Smith's last paragraph, I think his scheme would require more than usual head-room.

Although it relies on control circuits and contactors, "Novice's" suggestion could afford an additional and valuable safeguard.

My own limited observations do not confirm that the rope-driven over-travel limit switch is as dead as Mr. W. G. Dixie seems to imply. Good practice requires a final terminal stopping device in addition to the other safety features on a modern high-class lift. Moreover, there are many older and simpler lifts, the inherent dangers of which can be minimized by the fitting of a really good ultimate limit switch arrangement.

Bristol. F. P. PHILLIPS.

Fine-Gauge Copper Wires

MR. BENNETT alleges that the weakness of modern car wiring is in the loom or harness system. As the largest manufacturers of car harness in this country, having over 15 years' experience, we claim to know something about this matter and we emphatically deny that there is any trouble over broken wires. On the contrary, the quality of car wiring has been improved so much that, in spite of many complications, faults are almost unknown. We make many thousands of separate car harnesses each week and any fault would soon be made known to us.

There is only one accessory on a car of which complaints have been made regarding broken wires and that uses conductor size 25/.004 (25/42 s.w.g., not of our make) and it may interest your correspondent to know that we have been asked to solve this problem.

Regarding Mr. Bennett's assertion that "unfortunately during the war Government Departments were inclined to accept manufacturers' points of view, etc.," he is on even weaker ground. The facts are that this firm (being the largest producer of lacquered cables) was asked for advice on how to eliminate the bottlenecks in the production of aircraft cable. Our report was examined by a Government permanent technical staff and later considered and endorsed at a meeting of representatives of the C.M.A. and myself. Far from being an "unfortunate" acceptance by the Government Department, we were afterwards personally thanked by the then Minister of Aircraft Production for the valuable contribution we had made regarding aircraft cable.

In conclusion, may we say that if wire (whether 0.0076 or 0.012) is not properly annealed, troubles may arise under certain conditions, but specifications should not be condemned because of improper manufacture.

RIST'S WIRES & CABLES, LTD.,
A. RIST,
Managing Director.
Newcastle-under-Lyme.

COMMERCE and INDUSTRY

Showroom Competition : Damage at Portishead

A SHOWROOM window display competition organized by the North-Western Electricity Board throughout an area stretching from Buxton to Carlisle, with peak period electricity economy as the theme, has been won by the Middleton, Lancs, showroom. Sixty showrooms competed, and economy was the basis as well as the keynote of their work, for it was ruled that not more than £3 should be spent on displays. These had to show how domestic consumers could reduce the electrical load during the peak hours 8 a.m. to 12 noon and 4 p.m. to 5.30 p.m., with the least inconvenience.

A challenge cup, to be competed for annually, goes to the winning showroom, together with a replica. Replicas go also to the showrooms adjudged to have the best displays in each of the seven sub-areas. Sub-area winners were Salford, Ramsbottom, Middleton, Preston, Colne, Workington and Stockport.

The credit for the winning display goes to Mr. R. J. Yates (showroom manager) and Mr. E. Holt and Miss M. Breach, assistants. It tastefully depicts Mrs. Citizen helping Mr. Engineer over the Peak Load Stile, and incorporates peak period economy suggestions and a reminder of the electrical aids which can make life pleasant at off-peak times. The judging panel comprised Col. J. S. A. Walker and Miss N. Kenyon (members of the board), Mr. A. O. Johnson (chief commercial officer), Mr. John M. Holmes (principal, Manchester Municipal School of Art), Mr. A. R. Fasham (vice-chairman, Manchester Branch, Incorporated Advertising Managers' Association) and Mr. N. H. Bridge (the board's publicity and commercial officer).

Display at the Middleton showroom which won the N.W. Electricity Board's challenge cup

Radio Direction of Pilot Cutters

The Abertay lightship in the Firth of Tay and pilot cutters under the jurisdiction of the Dundee Harbour Pilotage Authority are now equipped with two-way G.E.C. radio telephone equipment. The shore station at Broughty Ferry, near Dundee, consists of a 10-W frequency-modulated transmitter-receiver operating on a frequency of about 70 Mc/s, while small transmitter-receivers of similar power are fitted to each of the ships. Use of this radio equipment greatly facilitates the control of marine traffic in the port of Dundee.

Sabotage Charge

At Bristol Quarter Sessions on 15th December Albert R. C. Vowles, of Portishead, was committed for trial accused of malicious damage and stealing two coupling bolts worth £1 15s.

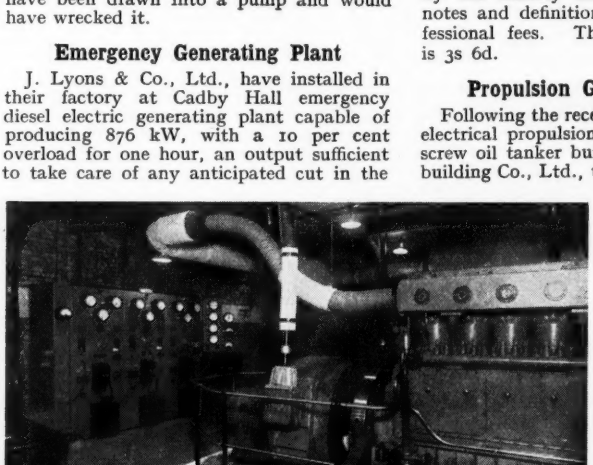
Mr. R. R. Thornton, prosecuting, said the offences must be given the ugly term sabotage. He said that a generator was being erected at Portishead as a matter of extreme urgency. Vowles was employed by the makers, Metropolitan Vickers, as a labourer, and on 25th May Mr. Ball, assistant erection engineer, received an anonymous letter which the defendant later admitted he had written. There was a threat in the letter. Later, Vowles was discharged, but not because of the letter. He obtained employment with another firm working on the power station and thus again had access to the machinery.

There was a minor incident in August

when a damper-door was unscrewed and placed on the floor, but on 4th November a boiler feed pump was opened up for routine inspection and it was seen that metal filings had been placed in the bearings. Fortunately, up to that time it had not been used. Mr. Ball had to have all the bearings taken down and for safety reasons all the other bearings had to be inspected. Four days later 24 special type coupling bolts were taken off and were missing from these pumps. They were found concealed in seven different positions in large pipes which had been sealed up If one had not been discovered it would have been drawn into a pump and would have wrecked it.

Emergency Generating Plant

J. Lyons & Co., Ltd., have installed in their factory at Cadby Hall emergency diesel electric generating plant capable of producing 876 kW, with a 10 per cent overload for one hour, an output sufficient to take care of any anticipated cut in the public power supply. The equipment comprises three Mirrlees "TLB8" eight-cylinder totally enclosed airless injection vertical four-stroke diesel engines, developing 420 b.h.p. at 600 r.p.m., coupled to 292 kW Brush alternators. The three sets, which can be run either singly or in parallel, are controlled by a three-panel stationary cubicle type oil circuit breaker alternator control switchboard, also of Brush manufacture.



One of three Mirrlees-Brush diesel-electric generating sets installed at Cadby Hall

Story of Mica

An interesting booklet received from Langley London, Ltd., 72, Borough High Street, S.E.1, contains a brief illustrated description of mica and its uses. First it deals with the mineral's chemical composition and then goes on to deal with the sources and properties of mica. Processing is covered and the building-up of the splittings into micanite is described. The illustrations show many examples of mica elements for various purposes.

Professional Practice in Engineering

A twelve-page booklet entitled "Professional Practice in Engineering" has been published by the Society of Engineers. It lists the minimum fees chargeable on time and commission bases which are recognized by the Society and includes explanatory notes and definitions relative to such professional fees. The price of the booklet is 3s 6d.

Propulsion Gear for Tankers

Following the recent installation of G.E.C. electrical propulsion equipment in a single-screw oil tanker built by the Furness Shipbuilding Co., Ltd., the General Electric Co., Ltd., has now been commissioned to supply similar equipments for a further three tankers. These vessels, which are under construction for the Eagle Oil & Shipping Co., Ltd., will have an overall length of 530ft and a 69ft beam. Each propulsion motor comprises a 3.3 kV salient pole machine, 9,000 s.h.p. at 124 r.p.m., supplied from a turbo-alternator giving an output of 7,000 kW at 3,230 r.p.m., 53.8 cycles. Auxiliary power at 220V is supplied by two 400 kW d.c. geared turbo-generators running at 1,000 r.p.m. The h.v. control gear is enclosed in a steel cubicle and a simple control desk houses the l.v. d.c. switchgear and instruments. Manœuvring is effected by three controls; (a) a lever which actuates the h.v. direction switch through an oil servo-operated gear, (b) a hand wheel to control the starting sequence by direct mechanical operation, and (c) a hand wheel to control the turbine speed. All three controls are mechanically interlocked to prevent incorrect operation.

Radio Research Report

A 39-page booklet which will assist engineers to design radio communication ser-

vices for maximum efficiency has recently been published for the Department of Scientific and Industrial Research by H.M. Stationery Office, price 9d (25 cents U.S.A.), by post 10d. This Radio Research Special Report No. 16 is a note on long wire and horizontal rhombic aerials, presenting in a convenient form a generalized analytical method of determining the relevant polar diagrams

New Philco Company

Philco (Great Britain), Ltd., is the newly formed company which has just completed agreements with the Philco Corporation, Philadelphia, and its subsidiary in London, Philco (Overseas), Ltd., for the sales, service and advertising of all Philco products in Great Britain, the Channel Islands and Northern Ireland. This is a private company of which the shareholders are ten area distributors.

The company will work in close co-operation with the recently formed Philco (Overseas), Ltd., which will be responsible for the design, engineering and production of British-made Philco products. The range of products will be widened to include not only television, domestic radio and car radio receivers, but also gramophones, refrigerators, freezers, air conditioners, and many other lines.

Navigational Exhibition

On Friday last, at the Royal Geographical Society the Duke of Edinburgh opened the Institute of Navigation's Exhibition, "Navigation Through the Ages." A special feature of this exhibition was the collection of both historical and modern radio apparatus, lent by the Marconi Company, which ranged from the first type of wireless transmitter installed in ships at sea to the latest types of communication and navigational aid equipment for ships and aircraft. This demonstrated the enormous strides the radio industry has made since Marconi's first experiments in 1896 and the valuable contribution which these were to the advancement of the science of navigation in the succeeding fifty years.

New B.I. Callender's Subsidiary

British Insulated Callender's Cables, Ltd., announces the formation of a wholly owned subsidiary company to take over the activities of the civil engineering and cable contracts departments. The new company will be known as British Insulated Callender's Construction Co., Ltd. The Board of directors will consist of Mr. P. V. Hunter (chairman), Sir Johnstone Wright (deputy chairman) and Messrs. H. F. Akehurst, C. S. Bell, W. C. Handley, W. G. Hendrey and H. J. Stone. In addition the following will be executive directors: Mr. C. O. Boyse (general manager). Mr. O. J. Crompton (manager, traction contracts), Mr. C. H. Frankland (manager, cable and overhead line contracts), and Messrs. F. de B. Hart and F. B. Kitchin (joint managers, developments and special projects). Mr. W. E. Tipton is to be secretary-accountant.

The new company, which will begin operations on 1st January next, will have its headquarters at Bical House, Bloomsbury Street, London, W.C.1, and will undertake contracts for cable laying, overhead line construction, and electric traction overhead equipment; also for radio masts and towers and Callender-Hamilton bridges and aircraft hangars. Existing local contract establishments of the parent company throughout Great Britain will be transferred to the Construction Company. Contract offices abroad will, in general, also be so transferred, except that India and Pakistan, and in South Africa, the Construction Company will operate through the parent company's existing establishments.

New B.I.F. Design

The "key" design hitherto used to symbolize the British Industries Fair has now been superseded by a new one more indicative of the nature of the Fair. As will be seen from the accompanying illustration it depicts two gear-wheels with the initials and date; the lettering is red on an orange background.

New B.I.F. symbol

Birmingham Guide

The City of Birmingham Information Department has issued a new "Hotel Guide," which should be of value to visitors to next year's British Industries Fair. The folder contains particulars of hotels, private hotels and boarding houses, and includes a map of the City Centre and information for motorists, together with addresses of Corporation and Government Departments. Copies of the guide can be obtained from the Information Department, Council House, Birmingham.

Dissolutions of Partnership

Messrs. J. W. Plant and T. Smith, carrying on business as electrical contractors and

engineers at 135a, Stamford Street, Stalybridge, Ches., have dissolved partnership. Mr. Plant will attend to debts and carry on the business.

Messrs. S. A. E. Wharrad, C. Wharrad, H. R. Ison & F. Ellis, carrying on business as electrical contractors at 51, Friston Street, Ladywood, Birmingham, under the style of Frank Ellis & Co., have dissolved partnership so far as concerns Messrs. C. Wharrad and S. A. E. Wharrad, who retire from the firm.

Messrs. L. S. Harvey and R. K. Tilyard, trading under the style of Harvey & Tilyard, electrical contractors, at 6, Central Reculver Road, Beltinge, Herne Bay, Kent, have dissolved partnership. Mr. Harvey will attend to debts and carry on the business.

Consultative Work by Board

A report presented to the Bedford Borough Council states that the Eastern Electricity Board has offered its services in connection with the preparation of specifications and forms of tender for electrical work. The Board is prepared to undertake such work on payment of a fee of 5 per cent of the cost of the work specified up to £500, and 2½ per cent thereafter. In certain areas it will also be prepared to submit a tender for the work, and if its tender is accepted it will forgo the fee for the consultative work. The Council is recommended to accept the offer.

Siemens-Schuckert (G.B.) Acquired

It is announced by Siemens-Schuckert (Great Britain), Ltd., Brentford, Middlesex, manufacturers of electric furnaces, spot and seam welders and colliery electrical equipment, that the whole of their share capital has been acquired from the Custodian of Enemy Property by Bryce, Ltd., an associated company of the Hackbridge Cable Co., Ltd. The present policy in connection with the sales and technical development of the range of products at present manufactured by Siemens-Schuckert (Great Britain) will continue and it is proposed to gradually widen the company's range of equipment.

Trade Announcements

The address of the Liverpool branch premises of **W. T. Henley's Telegraph Works Co., Ltd.,** is now Henley House, 29, Hope Street, Liverpool, 1 (telephone: Royal 4137/8). The Bristol branch has been removed to 72/74, Milk Street, Bristol, 2 (telephone: Bristol 25730).

On the 1st December the Rectifier Division of **Standard Telephones and Cables, Ltd.,** was consolidated in new premises at Warwick Road, Boreham Wood, Herts. The Boreham Wood location was used as a shadow factory for rectifier disc manufacture during the war, and the recent acquisition of several adjacent premises has enabled the sales, engineering and production sections to be constituted, for the first time, as a complete and self-contained unit.

Mr. Angus Wilson has been appointed Scottish area representative of **Parnall (Yate), Ltd.** He commences his duties on 1st January and will operate from 27, Constitution Street, Dundee (telephone: Dundee 4830).

Ekco-Ensign Electric, Ltd., announces that as from 1st January 25W and 40W candle lamps will be available in an extended range in various colours. A conical 12in 60W tubular lamp and cruciform neon lamps will also be available.

Government Wire Specification

The Committee on the Standardization of Electrical Cables and Wires for Government Services (Secretary, Ministry of Supply, I.E.M.E., "Walsingham," Chislehurst, Kent) has recently issued a revised version of G.D.E.S. 22-1948 for Equipment Wires. Some types and sizes have been deleted from the previous issue, and a number of other minor modifications made. Copies can be obtained from H.M. Stationery Office, price 3d.

Catalogues and Lists

Electro Dynamic Construction Co., Ltd., St. Mary Cray, Kent.—Priced stock list of motors, generators and rotary convertors.

C. C. Wakefield & Co., Ltd., 46, Grosvenor Street, London, W.1.—Forty-four page technical brochure on oil engine lubrication.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Illustrated brochure describing the "Oralix" dental X-ray equipment.

Electro-Mechanical Supplies, Ltd., 39, Queen's Road, Coventry.—Catalogue of special industrial distribution equipment.

Abbott, Birks & Co., Ltd., 90-91, Blackfriars Road, London, S.E.1.—Priced leaflet on "Abbirko" wiremen's floorboard tools.

Compoflex Co., Ltd., 14, Dartmouth Street, London, S.W.1.—Brochure describing "Compoflex" flexible tubing.

Covered Conductors Association, High Holborn House, 52-54, High Holborn, London, W.C.1.—Technical brochure on the varnish treatment of coils wound with enamelled wire.

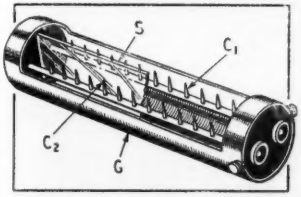
Morganite Resistors, Ltd., Paulsway, Bede Trading Estate, Jarrow, Co. Durham.—Leaflet on heavy duty carbon resistors.

Static Eliminator

DISPERSAL BY IONIZATION IN TEXTILE PROCESSING

CHARGES of static electricity probably accumulate during all dry processing of textile materials, resulting from the separation of dry surfaces and are accentuated by rubbing contact when yarn is passed over rollers or through reeds.

In most cases the charge leaks away through moisture in the air before it noticeably affects processing operations. Cotton



Ionizing electrode, showing positive and negative rows of discharge points with acetate separating barrier, as fitted to sectional warping machine

is unlikely to be troublesome when processed in an atmosphere of 35 per cent relative humidity because it is hygroscopic, more or less, whereas acetate rayon accumulates a charge more easily because it is a better electrical insulator, while nylon yarn is so good an insulator that it is almost impossible to process it in an atmosphere sufficiently humid to allow the static charge to leak away. The working difficulties are due to three main causes.

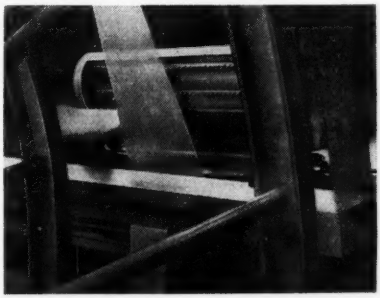
First, the mutual repulsion of charged yarns makes them spread balloon-like (if not controlled by tension) during sectional warping. The yarns at the edges of a section bulge out sideways as they go on to the mill, becoming trapped by subsequent layers of the warp and causing trouble during the beaming-off process. Individual fibres may repel each other when carding acetylated cotton, acetate fibre and nylon, resulting in flying and rolling of the web. The filaments of low-twist nylon yarns may separate, then being more liable to catch on slight projections from the surfaces over which they pass. Charged fabric emerging from a stenter may refuse to be plaited down neatly, successive layers slithering over each other uncontrollably due to mutual repulsion.

Secondly, charged textiles tend by attraction to adhere to the metal flanges of bobbins, thus mounting the sides and causing bad winding.

Thirdly, there is the risk of electric shock and drawing sparks from machinery.

Humidifying limits are ill-defined and over-wetting will cause the yarn to stretch. Anti-static dressings in the form of conductive emulsions have not been entirely successful, so electrical elimination by ionizing the air surrounding the charged material is being tried. The effective range of an a.c. mains energized outfit is limited to a few inches due to the neutralization of positive and negative ions emitted alternately from the same discharge points. Capacity effects of high-voltage leads within earthed conduit also necessitate the provision of an individual power pack for each processing machine.

These disadvantages are not shared by the eliminator designed at the Shirley Institute of the British Cotton Industry Research Association, which is now manufactured under licence by the Record Electrical Co., Ltd. The use of rectified a.c. enables the effective range to be increased to several feet, if ions of one sign only are produced; but it is usually better to provide ions of both signs (6 to 24in working range) by separate positive and negative discharge electrodes. This arrangement permits the electrodes to be more conveniently mounted than when "raw" a.c. is employed and one power pack will serve several machines (thirty for sectional warping) since high-



Discharge electrode mounted on warping machine, seen through side of machine

voltage d.c. leads can be enclosed in earthed metal conduit.

The few watts needed are derived from single-phase a.c. mains through a step-up 230/6,000 V transformer connected to Westinghouse metal rectifiers whose d.c. output is doubled to furnish 12,000 V positive and negative respectively to earth. The power pack is thus divided into two separate

similar parts, the output of each rectifier bank passing through a protective relay (set to close at 2 mA) which inserts a choke across the a.c. 230 V input (8 A limit) and also opens an overload (2 A trip) circuit-breaker. An additional safeguard is a tripping interlock fitted to the lid of the sheet-metal case, measuring 12 by 12 by 9in, mounted on the wall.

Distribution from the latter is through earthed conduit with special junction boxes providing four branch circuits from each box, each branch ending in a resistance box (for "short circuit" limitation to 6 mA at the discharge electrode) near its associated processing machine. The final connection is by flexible lead with plug and socket attachment, enabling individual electrodes to be disconnected without interrupting the remainder of the installation and, moreover, permitting an electrode to traverse with the reed on a warping frame.

The size and shape of the discharge electrode depend upon the machine to which it is to be fitted and may range from a single-point for one head of a winding machine to a double row of points across the width of a card or the length of a doubling machine. For beaming, because of the unpredictable changes in sign of the static charge, simultaneous ionization of both signs by a double electrode is usually necessary.

Slow Down at Barking

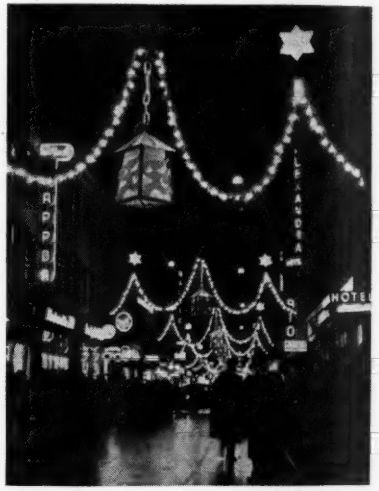
AT about 4 p.m. on 16th December, day-workers at Barking power station walked out on account of a dispute about bonus payments. As a consequence certain machines were slowed down by the operations staff, and about 200,000 kW of capacity was lost, leading to supply interruption in the London Area. The trouble was promptly dealt with and normal supplies were restored by 5.45 p.m

The dispute was due to a misunderstanding as to a special bonus to which the workers at Barking power station are entitled as a condition of their employment. As an inheritance of pre-vesting days, other bonus systems apply to workers in certain districts and the question of continuance of profit sharing and co-partnership payments is under consideration by the negotiating machinery set up by the British Electricity Authority and the trade union concerned. While negotiations are going on the bonus payments of this character are not being paid to new employees engaged after 1st April, 1948 (vesting date), but they are being continued to those formerly receiving them.

The misunderstanding that gave rise to the Barking dispute was that about ninety employees engaged after vesting date were not paid the special bonus which is part of the standard condition of employment of this station. When the facts of the case were brought to the attention of the B.E.A. proper payment was authorized.

Christmas Illuminations in Sweden

IT is so long now since street illuminations were allowed that many of us may have forgotten what they looked like at Christmas time; most children will never even have seen the streets decorated with lights. To remind ourselves of the sort of thing we can look forward to in the, we hope, not too distant future, we reproduce from the *Anglo-Swedish Review* a picture



Stockholm street illuminated for Christmas

of a Stockholm shopping street dressed for Christmas. This decorative street lighting is resumed after a period of two years during which the power situation precluded the use of electricity for other than essential purposes.

Patents and the Engineer

AT a meeting of the London Students' Section of the I.E.E. recently Mr. L. H. Carr, M.Sc.Tech., gave "The Students' Lecture" on "Patents and the Electrical Engineer." Mr. Carr described the work of the Patent Office, the laws relating to the filing of a patent and some of the earliest patents relating to electrical machinery.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Tube Investments, Ltd.—In the course of his speech at the annual meeting held on 15th December, Mr. I. A. R. Stedeford (chairman) referred to the need of training in the science of production. Dealing with the various divisions of the group, he said that but for the acute shortage of electricity supplies it was quite certain that the electrical division would have had a year of prosperous activity. The 100 per cent purchase tax on certain electrical domestic appliances created serious problems, and one of their largest factories suddenly found its output curtailed by 60 per cent, resulting in the displacement of many workers. During the period of generating plant shortage, manufacturers of these consumer goods must expect to suffer restrictions. He would suggest, however, that the British Electricity Authority should give serious attention to the desirability of a policy of replacement of essential cooking and water-heating appliances. Much of this equipment was old and inefficient both as to electricity consumption and maintenance and replacements. A replacement policy would effect a considerable saving in the domestic consumption of electricity.

Mr. Stedeford said that their exports reached a total of over £10 millions, a record, and 34 per cent of the exports were despatched to markets designated by the Board of Trade as "desirable markets." Referring to the establishment of factories abroad, he urged British industry to exercise the greatest caution in determining how and when it should export its technical skill and experience, which were now among the few remaining assets which this country enjoyed. To erect factories abroad before it was necessary to do so was a poor compromise to exporting goods from home factories. Such projects, far from contributing to the national income, would constitute a drain on our resources, cut down our exports, and scatter our already too few technicians and executives.

Electric & Musical Industries, Ltd.—Presiding at the annual meeting held on 14th December, Sir Alexander Aikman (chairman) said that they had continued the development of the E.M.I. system of television operating at Alexandra Palace, and the design of the new type television camera which proved such a success during the Olympic Games. The E.M.I. electric training institution was giving instruction to 1,300 students from the United Kingdom and a number of overseas countries. They had more than maintained their export position and during the year under review they had increased their exports by over 10 per cent above the previous year's figure of £2,000,000.

Sir Ernest Fisk (deputy chairman and managing director), in seconding the motion for the adoption of the report and accounts, said that up to date orders for the E.M.I. magnetic tape recorder had been received at a faster rate than they had been able to manufacture. He had made it clear to the authorities in Canada and Australia that the E.M.I. television system was not limited to 405 lines, nor to the somewhat higher American standard. They could supply television equipment up to 625 lines, and they could go even higher if any country required that. Australia had called for tenders for six television stations—one for the capital city of each Australian State. Before the Olympic Games they had designed and manufactured for the B.B.C. new mobile television equipment for television outside broadcasting, and the B.B.C. had ordered a duplicate. Apart from television, radar and acoustics they were continually broadening the field of their research, development and manufacturing activities.

The British Electric Resistance Co., Ltd., held its annual meeting on 16th December, when Mr. H. Paul-Huhne (chairman) said that their research policy had enabled them to extend their activities to the manufacture of two potential lines; a voltage regulator and a stoneware tank distribution transformer. A satisfactory feature of the year's trading was a steady increase in overseas sales. The supply of skilled labour available was still a factor which limited the output of the works. This had slightly improved in the past few months as had also the material supply position, with the exception of supplies of core steel and electrical porcelain. They had commenced the current year with a well-filled order book.

Turner & Newall, Ltd., report a consolidated net profit for the year ended 30th September last of £6,978,813, an increase of £1,966,752 as compared with the preceding year. It is proposed to pay a final dividend on the ordinary capital of 11¼ per cent, maintaining the distribution at 15 per cent. The net profit of the parent company was £2,602,361 (against £816,238). The allocation to reserve against investments in overseas subsidiaries is increased from £89,180 to £1,000,000, and general reserve is raised from £200,000 to £1,000,000.

The General Cable Manufacturing Co., Ltd., reports net profits for the year ended

30th September last of £87,424, before tax, as compared with £51,054, after tax, for the previous year. The balance carried forward is £15,413 (against £14,924 brought in). The second interim dividend of 30 per cent, less tax, is to be confirmed as the final dividend, making 50 per cent for the year (unchanged).

The Renold & Coventry Chain Co., Ltd., has declared an interim dividend of 3 per cent (same).

New Companies

Machlett X-ray Tubes (Great Britain), Ltd.—Registered 10th December. Capital, £100,000 in £1 shares (1,000 founders' and 99,000 ordinary). Designers, manufacturers, importers, exporters and dealers in X-ray tubes and valves therefor, etc. Directors: L. C. Gamage (joint managing director of General Electric Co., Ltd., etc.), A. J. Minns (director of Watson & Sons (Electro-Medical), Ltd., etc.), and R. R. Machlett (director of Machlett Laboratories, Inc.). So long as Machlett Laboratories hold all the founders' shares they may appoint one director, Mr. R. R. Machlett being the first nominee. Regd. office: 33, Newton Street, W.C.2.

Philco (Great Britain), Ltd.—Registered 16th December. Capital, £48,000. Distributors, exporters, importers and manufacturers of and dealers in radio and television apparatus, etc. The company's right to use the word "Philco" is subject to the right of the Philco Corporation, of Philadelphia, U.S.A., to require the company at any time to change its name. Subscribers: M. Bennett and E. J. Newman. Regd. office: 1, Drapers Gardens, Throgmorton Avenue, E.C.2.

Prescast (Bradford), Ltd.—Registered 10th December. Capital £1,000. Manufacturers of electrical apparatus and material of all kinds, textile machinery, building materials in alloy castings, etc. Subscribers: Mrs. Lucy E. Harrison and G. J. D. Dennison. Regd. office: Holme Works, 75, Holme Street, Horton Lane, Bradford.

Rediffusion Holdings, Ltd.—Registered 11th December. Capital £1,000. To carry on the business of an investment and trust company; to establish wireless signal and television stations, etc. Subscribers: W. F. Brooks and W. H. Eyre. Solicitors: Sydney Morse & Co., 1-6, Aldersgate Street, London, E.C.1.

Tack Air Conditioning Ltd.—Registered 3rd December. Capital £30,000. To acquire, direct and control the whole of the existing organization developed for the distribution of all Ozonair air conditioning units and products, and to carry on the business of manufacturers, agents, distributors and sales concessionaires of air conditioning, heating and ventilating units and plants, etc. Directors: A. Tack and G. Tack. Solicitors: Beaumont & Son, 380, Gresham House, E.C.2.

P. J. Stephens, Ltd.—Registered 10th December. Capital £500. Electrical engineers, contractors, electricians, radio engineers, etc. Directors: P. J. Stephens and Mrs. Joan Stephens. Reg. office: 21, Queens Parade, Friern Barnet Road, Friern Barnet, N.11.

V. J. Richards, Ltd.—Registered 8th December. Capital, £3,000. Electrical engineers and contractors, manufacturers, repairers and dealers in electrical and mechanical apparatus and components, including radio and television, etc. Directors: V. J. Richards and Mrs. J. I. Richards, both of 426, Ladypool Road, Birmingham, 12.

Electric Betalite Co., Ltd.—Registered in Dublin 1st December. Capital £3,000. To acquire the business of wholesale and retail merchants, importers and distributors, formerly carried on by B. Ward and Mary T. Ward as the Electric Betalite Co. at 22/23, Dawson Street, Dublin. Directors: B. Ward and Mrs. Mary T. Ward, both of 30, Shandon Crescent, Philsboro, Dublin, and two others.

Meeting of Creditors

Charlton Electrical Appliances, Ltd.—Meeting of creditors at 4, New Street, Leicester, on 30th December for the purposes mentioned in sections 294 and 295 of the Companies Act, 1948.

Bankruptcies

J. A. Waghorn, 10, Sangora Road, London, S.W.11, and lately carrying on business at 91, Eccles Road, London, S.W.11, electrical engineer and contractor.—First meeting held 21st December. Public examination 4th February at the County Court, Garratt Lane, Wandsworth.

J. Barnett, residing at 375, Eastern Avenue, Ilford, Essex, and **M. Barnett,** residing at 102, The Drive, Ilford, trading in partnership as Barnett Supplies Co., at 102 and 104c, Cranbrook Road, Ilford, radio, electrical, television dealers and contractors.—Trustee, Mr. N. W. Osborne, 11-12, Finsbury Square, London, E.C.2, appointed 3rd December, 1948.

T. Riley, residing at The Haven, Boundary Lane, Mossley, Congleton, Ches., and lately carrying on business at 58, Station Road, Tunstall, Stoke-on-Trent, electrical contractor.—First and final dividend of 19s 6½d in the £, payable 20th December at the Official Receiver's Office, 12, Lonsdale Street, Stoke-on-Trent.

STOCKS and SHARES

THE third instalment, of 40 per cent, on British Electricity 3 per cents 1974-1977, is due to be paid on the 3rd January. It will call for £40 million cash, and is regarded as contributory to the rather quieter tendency noticeable this month in the gilt-edged market. The stock will then become 75 per cent paid, the final instalment of 24½ per cent falling due on 5th March, when the initial interest payment of 12s 6d (less tax) per cent also becomes payable.

Other events tending to subdue the market include Inland Revenue claims in connection with the "special contribution," income-tax and super-tax demands, and the seasonal Christmas distractions to business. In the circumstances, the recent reaction in prices of Government securities is regarded as moderate in comparison with the previous rise. The original British Electricity "threes," redeemable 1968-1973, stand at 102⅜, nearly two points above the longer-dated newcomer. Transport "threes" are steady at 99⅛.

Looking Ahead

As regards industrial shares, the restriction imposed by dividend limitation seems to have comparatively little influence nowadays. Investment is not averse from accepting a moderate yield for the time being, provided there is a reasonable hope of getting something substantial later on.

During the past week, distribution of £20 million by the Argentine railway companies to their stockholders, has released additional capital, some of which, despite the Christmas spending, finds its way into the Stock Exchange markets. A minor feature has been a spurt in the mercurial Cable & Wireless ordinary stock which, from 207, rose to 214 in a couple of days.

E.M.I. Meeting

It seems likely that Electric & Musical Industries 10s shares will have the distinction of ending this month at about their highest price of the year. Starting at 20s 9d they were below 15s at one time, but recrossed the £1 mark on the strength of last month's annual report. The price still further improved to 21s 3d after Sir Alexander Aikman's speech at the meeting. The market was impressed by the variety and scope of the group's present-day interests. The chairman made a significant contribution to current criticism of excessive taxation and inadequate allowances, as an obstruction to the maintenance of industrial efficiency. (This point, incidentally, was pressed further home by Mr. Stedeford at the Tube Investments meeting last week.) The E.M.I. 8 per cent dividend is covered by group earnings of 30 per cent and affords a yield of £3 15s 3d per cent on the shares at their present price.

Week's Price Changes

Few alterations of consequence have occurred in prices during the past week. Apart from the rise in Cable & Wireless stock already mentioned, British Electric Traction deferred at 1925 is 25 points higher, and Vactric ordinary, after rising 2s 6d to 16s 3d, reacted to 15s. There is still no official announcement to throw any definite light on the reason for the Vactric rise. It is well known to be due to American buying. Decca Record at 22s 6d are 1s 6d up. Tube Investments at 6⅝ and Siemens at 35s 6d have both hardened. On the other side of the sheet, Globe Telegraphs at 48s 6d are down 6d, Radio & Television at 6s being similarly easier.

Brush Electrical and A.B.E.

After an interval for consideration of the proposed deal between Brush and Associated British Engineering, the shares concerned are finding a level at about 7s 3d for the former's 5s units and 75s for A.B.E. £1 ordinary. Before publication of the details a fortnight ago, they stood at 7s 6d and 43s respectively, so that A.B.E. have jumped no less than 32s, while Brush have gone back a few pence. Shareholders of both companies will meet on the last day of the year to discuss the plan. It involves the transfer to Brush of two A.B.E. subsidiaries for a consideration of £1,600,000, to be satisfied through the issue by Brush of preference and ordinary shares, leaving A.B.E. in possession of about half Brush's capital of each class.

Miscellaneous Matters

Scophony 1s shares have practically doubled in value over the past few weeks. Present activity at around 3s is connected with the company's recent acquisition of J. L. Baird, Ltd., and with rising interest in the future of television for both home and cinema purposes. The chairman and managing director of Scophony hold the same offices in Capital and Provincial News Theatres, reported to be actively interested in cinema television. Among stocks on offer in the electrical markets are small lines of Oldham & Son 1s shares at 11s 6d, and Hackbridge & Hewittic 5s shares at 11s 9d, the yield in each case being a shilling or two over 5 per cent. Returns of nearly 5¾ per cent are available for Parmiter, Hope & Sugden 1s ordinary at 5s 3d, and Plessey 5s ordinary at 17s 6d. In the preference lists Thorn Electric 5 per cent on offer at 22s 6d yield £4 8s 9d per cent.

NEW BOOKS

Art of Exposition : C.R. Tubes in Radar Displays

The Presentation of Technical Information. By Reginald O. Kapp, B.Sc. (Eng.), M.I.E.E. Pp. 147. Constable & Co., Ltd., 10, Orange Street, London, W.C.2. 6s.

Since an engineer can accomplish little except in co-operation with others, he must be able to express himself logically and accurately in a way that is comprehensible and attractive to those to whom he wishes to convey his views. The present publication, based upon four lectures delivered by Professor Kapp under the auspices of University College, London, should be of considerable help to engineers of all categories in the art of exposition.

This aspect is quite distinct from problems of grammar and syntax or even from the clear statement of facts, as the author indicates. It implies the ability to use functional English in a way that will maintain receptivity in the person addressed. The first requirement is, therefore, that the writer or speaker shall think about his readers or his audience. In developing this theme Professor Kapp discusses such questions as association of ideas, methods of aiding understanding, memorizing, timing and the proper use of words and metaphors.

In dealing with the difficult question of what to include in or omit from a report, reference might have been made to the desirability of relegating to appendices supporting matter that is too heavy for insertion in the body of the text. The book can be recommended as meeting a general need.

—C. O. B.

Cathode-Ray Tube Displays. By T. Soller, M. A. Starr and G. E. Valley. Pp. 491; figs. and index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 60s in the United Kingdom.

This American book gives a complete account of the use of the cathode-ray tube in radar displays. Starting with the tube itself the authors discuss focusing methods, circuit techniques, the transmission of position data, deflection systems, rectangular, radial and sector displays, spot size and the fluorescent screen. In spite of its comprehensive nature, the volume overlaps others in the M.I.T. Radiation Laboratory series only to a small extent, chiefly in the sections on synchroscopes and servos.

In a few places the treatment seems less than adequate, such as that of the tube itself, although numerous curves and figures are included, which should be of use to an equipment designer. Radio-frequency power supplies are barely mentioned and power economy not at all. The chapter on screens gives an excellent qualitative account of fluorescence, but in the section on skiatrons it is made to appear that only the possibility of using the effect was demonstrated in England and that the development was done at the Radiation Laboratory. In fact, the skiatron was one of the rare devices in which the first samples were nearly as good as the final article. Neither is the British origin of the P.P.I. mentioned. These points, however, do not detract from the technical value of the book, which is one that every engineer concerned with display problems and instrumentation will wish to have at hand.—

A. H. B.

Palmer's Company Guide. By J. Charlesworth, LL.D., Barrister-at-Law (296 pp.) Stevens & Sons, Ltd., 119 & 120, Chancery Lane, London, W.C.2. Price 6s 6d.

The fact that this is the thirty-sixth edition of this "manual of everyday law and practice" testifies to its continuing usefulness. The revision includes the incorporation of the provisions of the 1948 Companies Act which made considerable changes in the law of the subject.

Directors and officers of companies will find here in a comparatively small compass most of the things that they should know regarding their duties and responsibilities.

—J. H. C.

Books Received

Gas Welding and Cutting. A Practical Guide to the Best Techniques. By C. G. Bainbridge, M.I.Mech.E., M.Inst.W. Pp. 305; figs. 186. Published for the Louis Cassier Co., Ltd., by Iliffe & Sons, Ltd., Books Department, Dorset House, Stamford Street, London, S.E.1. Price 15s (postage 6d).

A Textbook of Radar. By the Staff of the Radiophysics Laboratory of Australia. Pp. 579; figs. 347; index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 50s in U.K.

Electric and Diesel-Electric Locomotives. By D. W. and M. Hinde. Pp. 366; figs 167; index. Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2. Price 36s.

Electricity Supply

Retrospect at Farnworth : Portsmouth Deficit

Farnworth.—UNDERTAKING'S HISTORY.—The opportunity is taken, in publishing the 1947-48 accounts of the former Borough of Farnworth Electricity Department, to place on record some facts about its history in an illustrated booklet. A public supply of electricity was commenced in Farnworth (Ferneworth, "The place among the Ferns," as it was known in older times) in 1901, the first engineer being the late Mr. J. D. Pember, who was followed in 1904 by the late Mr. R. B. Leach. From 1910 to 1946 Mr. A. J. Hutchinson was chief, being succeeded by Mr. F. R. Haigh. In 1909 a refuse destructor was constructed and supplied steam to the electricity works, but the enterprise encountered many difficulties. Unhealthy working conditions caused the stokers to go on strike, while changing customs resulted in a dwindling amount of suitable refuse and electricity output (which augmented the bulk supply taken from the Lancashire Electric Power Co.) became intermittent. Finally, in 1918, generation by steam plant was discontinued. The last steam set to be removed was a Belliss and Morcom compound vertical steam engine direct coupled to a Westinghouse 200 kW generator installed in 1903. This was sold to the Douglas Head Tramway Co. and installed in the Port Soderick generating station, being finally dismantled when that company commenced taking a bulk supply in 1937.

Luton.—STREET LIGHTING.—The Ministry of Health has approved the provision of street lighting on the Leagrave estate (£5,000); Hart Hill estate (£2,120); and Ashcroft estate (£4,400).

Oldham. — LIGHTING CONVERSION.—The Lighting Committee proposes to install sodium lamps in Ripponden Road in place of the present gas lighting.

Portsmouth.—ENGINEER'S REPORT.—In his 1947-48 report on the former municipal electricity undertaking, Mr. R. H. Coates says that the results of nationalization so far confirmed his opinion, expressed in the previous report, that the effects at Portsmouth would be small. The increase in prices since 1st April would have been equally necessary if the undertaking had remained with the City Council—the accounts for 1947-48 showed a net working deficit of £96,537. In September, 1947, electricity prices for all supplies were only 6.7 per cent above pre-war, against 72 per cent in the case of the gas undertaking. Subsequent increases in January and August, 1948, had raised the electricity figure to 33⅓ per cent, which was still reasonable compared with other increases. Sales of electricity in Portsmouth last year were lower than in 1945-46 owing to the mild weather, but monthly figures for the past summer indicated a rise of 20 per cent.

Gas Turbines for Ships

Outline of British Developments

DETAILS of recent British developments in gas-turbine design for marine propulsion, including some information about novel reversing gear for ships, were given in the thirteenth Parsons Memorial Lecture which was delivered at the North-East Coast Institute of Engineers and Shipbuilders recently by DR. T. W. F. BROWN, research director, "Pametrada," otherwise the Parsons and Marine Engineering Turbine Research and Development Association.

The lecturer referred briefly to the progress being made by eight manufacturers and described the marine gas turbine of 3,500 h.p. designed at the "Pametrada" research station, which is now almost ready for its first trials. The constructional work is being shared by eleven member firms.

Dr. Brown stressed the difference between aircraft and ship requirements. A marine engine had to have a life of 100,000 hours which, based on the common figure of 200 days a year at full power at sea, meant twenty-one years' service. Manœuvring must be accurate and certain, ability to use fuel from a variety of sources was desirable and it should be possible for ordinary repairs to be carried out almost anywhere.

The advantages of gas-turbine propulsion were clear. The machinery could be made one-third lighter than present steam turbine plant; it had greater efficiency values than steam plant so, provided it could burn fuel of the same grade, it should reduce fuel bills. The machinery occupied less space and needed few auxiliaries; it could be started and take up load more quickly, thus reducing stand-by losses.

Among the items mentioned was a gas turbine with electric drive now being constructed by the B.T.H. Co. for installation in the M/S. *Auris*. The largest marine gas-turbine installation so far ordered was being constructed by the English Electric Co. for the Admiralty for installation in one of the "Captain" class of frigates.

Activity in Ontario

HYDRO-ELECTRIC COMMISSION'S BUSY YEAR

SUMMARIZING the 400-page annual report of the Hydro-Electric Power Commission of Ontario, Mr. R. L. Hearn, general manager and chief engineer, says: "In 1947 the Commission supplied the greatest load in its four decades of service and substantial progress was made upon the greatest power development programme in Hydro history." The expansion in the activities of the Commission is perhaps best illustrated by the large increase in personnel. During the year the Commission's staff grew from 7,963 to 12,758, while in the construction department the number of regular and temporary employees rose from 2,257 to 5,874.

Site of the Des Joachims development showing construction camp on the Ontario side

To cope with the ever-increasing demands it again became necessary to revise the development programme begun in 1945. Power resources available (generated and purchased) aggregated 2,050,000 kW, a figure which during the next few years will be increased by some 704,000 kW. The biggest project now in hand is a 358,000 kW scheme at Des Joachims on the Ottawa River. The main dam (incorporating the power house) will span three channels into which the river is divided by islands at the head of the Des Joachims rapids. On the same river a 119,000 kW plant (Chenaux) is under construction a few miles above Chats Lake, and the main dam from the Ontario shore to Limerick Island will be a concrete structure over 1,000ft long. Other schemes are at Aquasabon, on the river of that name (40,000 kW); Pine Portage, on the Nipigon River (60,000 kW); and at the Tunnel site, on the Mississagi River (42,000 kW). A 60,000 kW plant on the Madawaska River (Stewartville) was scheduled for commissioning in September, 1948.

Including transmission lines, the cost of engineering projects approved by the Commission stands at nearly $320 million. A capital construction programme of $57 million was budgeted for last year, and although labour and material shortages reduced the actual amount spent to $46 million, this was the largest expenditure for a number of years. Total energy output (generated and purchased) amounted to 13,655 million kWh, 7.8 per cent more than in 1946. Demand, however, rose at a greater rate than capacity, with the result that cuts of the order of 225,000 kW had to be imposed at the time of the winter peaks, and only for a short period in July and August was it possible to meet all the primary requirements. To relieve the situation a modified system of rationing was introduced in November, 1947.

Operating conditions provided some complex problems. In particular, a sleet storm of unusual severity caused such heavy icing of the transmission circuits in the Niagara Peninsula that 137 towers on two 44 kV lines collapsed. On two occasions there was a total failure of supply from Quebec sources caused by explosions in municipal dumps. Water conditions towards the end of the year were unfavourable and in the north-eastern section levels were the lowest recorded for over thirteen years.

In spite of difficulties, good progress was made in developing the rural electrical service, 21,000 new consumers being added

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AIR BREAK
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Never just fore and aft.
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FISCHER BEARINGS COMPANY LTD., WOLVERHAMPTON. Associated with British Timken Ltd.

and 1,000 miles of primary line built. The rural peak load in 1947 was three times that in 1938. The Commission aimed at serving a further 30,000 consumers during the current year, and to construct 3,400 miles of rural lines.

A large volume of research, testing and inspection work was carried out by the Commission's laboratory staff. One example is a long-range study of the use of magnesium rods for cathodic protection of domestic hot water tanks.

The organization of the Commission (administration, engineering and finance) came under review during the year. Final reports on engineering and finance were not available in 1947, but considerable reorganization of administration was undertaken, the theme being decentralization. The province has been divided into nine regions under regional managers, each of whom has a number of area managers who are responsible to him.

Gross revenue of the Southern Ontario and Thunder Bay Systems (including Rural Power Districts) in 1947 amounted to $57.1 million, with a net balance of $3.3 million. On Northern Ontario Properties the revenue was $6.8 million and there was a net loss of $0.2 million.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

METROPOLITAN-VICKERS Electrical Co., Ltd., and R. A. Polson.—"Control systems for power-driven movable abjects." 20286. 3rd December, 1943. (613805.)

1944

A. H. W. Beck, L. A. Cram and C. S. Wright.—"Electron-discharge devices." 12028. 23rd June, 1944. (613806.)

J. Compton Organ Co., Ltd., and L. E. A. Bourn.—"Electrical musical instruments." 20506. 23rd October, 1944. (613808.)

Marconi's Wireless Telegraph Co., Ltd.—"Magnetron and circuit therefor." 20675. 31st December, 1942. (613809.)

1945

J. Compton Organ Co., Ltd., and L. E. A. Bourn.—"Electrical musical instruments." 2279. 29th January, 1945. (613810.) Also 5676. 7th March, 1945. (613812.)

General Electric Co., Ltd., D. M. Dovey and S. V. Williams.—"Production of malleable iron." 13000. 24th May, 1945. (613514.)

Philco Radio & Television Corporation.—"Quenched amplifier system." 14933. 2nd August, 1944. (613819.)

A. Dewandre and F. Dacos.—"Electric battery-driven vehicle." 15147. 25th April, 1944. (613516.)

Association des Ouvriers en Instruments de Precision.—"Permanent magnets or other elements possessing permanent magnetism." 18400. 5th May, 1944. (Cognate application 18401/45.) (613825.)

R. C. Dehmel.—"Electrical integrating systems." 20278. 13th July, 1944. (Cognate application 20279/45.) (613829.)

Marconi's Wireless Telegraph Co., Ltd.—"Radio-broadcasting systems." 21663. 4th August, 1943. (613833.)

J. C. Balsbaugh.—"Electrical condenser." 25933. 5th October, 1945. (613521.)

D. S. De Lavaud and C. E. Milde.—"Electro-magnetic induction clutches." 27248. 17th April, 1944. (613839.)

National Lead Co.—"Electro-recovery of metals." 29039. 13th January, 1945. (613841.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & Co.—"Gas-blast electric circuit-breakers." 30738. 15th April, 1943. (Cognate application 30739/45.) (613844.)

Patelhold Patentverwertungs & Elektro-Holding Akt.-Ges.—"Carrier current transmission system." 31527. 22nd November, 1944. (613526.)

E. K. Cole, Ltd., and F. G. A. Haegele.—"Electric-discharge lamps and circuits therefor." 31564. 23rd November, 1945. (613847.)

Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares, Etablissements Claude-Paz et Silva.—"Electric system for feeding an electric-discharge tube." 33205. 24th April, 1945. (613849.)

R. V. Howard.—"Thermionic tube amplifier automatic regulating system." 34719. 19th July, 1944. (613530.)

1946

General Electric Co., Ltd., and A. S. Gladwin.—"Repeater systems for higher-frequency electric waves." 1972. 21st January, 1946. (613854.)

British Thomson-Houston Co., Ltd., and A. H. King.—"Frequency modulated oscillator." 2105. 22nd January, 1946. (613855.)

General Electric Co., Ltd., and E. S. Friedlander.—"Wattmeter type relays and like controlling devices." 2526. 25th January, 1946. (613856.)

E. L. C. White.—"Television transmitters and receivers or the like." 2614. 26th January, 1946. (Cognate application 23790/46.) (613857.)

Marconi's Wireless Telegraph Co. Ltd.—"Very short-wave radio viewing apparatus." 5346. 21st February, 1945. (613862.)

Standard Telephones & Cables, Ltd.—"Electric regulators." 6782. 27th January, 1945. (613866.)

A. Oschwald & Co.—"Device for the electro-magnetic release of camera-shutter and ignition of flash-light lamp." 7570. 26th March, 1945. (613868.)

F. Kesselring.—"Vibratory synchronously operating electric converting devices." 8649. 27th March, 1945. (Cognate applications 8650/46 and 8651/46.) (613540.)

M. Fassler.—"Means for controlling switching devices through the medium of electric vehicles." 9219. 25th March, 1946. (613541.)

Automatic Telephone & Electric Co., Ltd., T. P. Preist and G. R. Hutchings.—"Electrical signalling systems suitable for use in mines or the like." 14154. 10th May, 1946. (613876.)

General Electric Co., Ltd., and C. A. Maer.—"Control of alternating-current motors for driving winder equipment." 14986. 17th May, 1946. (613549.)

Standard Telephones & Cables, Ltd., and K. G. Hodgson.—"Arrangements for the transmission of electric signals occupying a wide-frequency band." 15184. 20th May, 1946. (613877.)

British Thomson-Houston Co., Ltd.—"Polymerization in the presence of copper or a copper alloy. 17623. 13th June, 1945. (613880.)

Lumalampan Aktiebolag.—"Choke or transformer in an electric-discharge lamp circuit, having a combined condenser and magnetic core." 17942. 19th June, 1945. (613551.)

Standard Telephones & Cables, Ltd.—"Granule telephone transmitters." 18000. 29th October, 1943. (613552.)

Standard Telephones & Cables, Ltd.—"Telephone systems." 18010. 11th July, 1941. (613553.)

Amalgamated Wireless (Australasia), Ltd.—"Signal circuit arrangements." 18017. 15th June, 1945. (613555.)

Philips Lamps, Ltd.—"Electric-discharge tubes." 18032. 15th June, 1945. (613556.)

C. H. Parsons, Ltd., and G. B. Handley.—"Electric fuse-holders." 18077. 15th June, 1946. (613558.)

Standard Telephones & Cables, Ltd., B. B. Jacobsen and W. J. Frankton.—"Stabilized thermionic valve oscillators." 18116. 17th June, 1946. (613567.)

Ilford, Ltd., R. J. Hercock and D. M. Neale.—"Timing devices using thermionic valve circuits." 18134. 17th June, 1946. (613565.)

British Thomson-Houston Co., Ltd.—"Halogenated hydrocarbon compositions." 18139. 18th June, 1945. (613566.)

Landis & Gyr Soc. Anon.—"Time controlled maximum demand contactor devices." 18186. 26th June, 1945. (613571.)

C. G. Smith and H. E. Morgan.—"Anodes for electroplating vats." 18205. 18th June, 1946. (613572.)

Standard Telephones & Cables, Ltd., and L. J. Heaton-Armstrong.—"Control arrangements for telegraph transmitters." 18256. 18th June, 1946. (613605.)

Communications Patents, Ltd., and H. J. B. Chapple.—"Distribution of television signals." 18265. 18th June, 1946. (613606.)

Rauland Corporation and Perkin-Elmer Corporation.—"Television and like receivers." 18284. 19th June, 1945. (613608.)

P. F. Clark.—"Arrangements for laying cables." 18317. 18th June, 1946. (613577.)

Automatic Telephone & Electric Co., Ltd., O. A. Pearce and R. Taylor.—"Automatic switches for use in telephone and like systems." 18365. 19th June, 1946. (613583.)

Pye, Ltd., and T. A. Butler.—"Screening cans particularly for use in high-frequency apparatus." 18375. 19th June, 1946. (613585.)

Steatite and Porcelain Products, Ltd., J. Woodcock and J. K. Paridge.—"Ceramic insulating bodies." 18409. 19th June, 1946. (613612.)

Standard Telephones & Cables, Ltd., and D. H. Ransom.—"Automatic telephone exchange equipment." 18558. 20th June, 1946. (613617.)

Induction Heating Corporation.—"Inductor for induction heating apparatus." 18569. 27th June, 1945. (613618.)

F. B. Dehn (Collins Radio Co.).—"Wireless transmitter-receiver combination." 18608. 20th June, 1946. (613624.)

Marconi's Wireless Telegraph Co., Ltd.—"Electrical condensers." 18627. 22nd June, 1945. (613627.)

Automatic Telephone & Electric Co., Ltd., and S. R. Smith.—"Signalling devices." 18658. 21st June, 1946. (613629.)

Burco, Ltd., and D. K. Ward.—"Wash-boilers." 18721. 21st June, 1946. (613633.)

British Mechanical Productions, Ltd., and S. T. Deakin.—"Holders for thermionic valves." 18727. 21st June, 1946. (613634.)

Wandsworth Electrical Manufacturing Co., Ltd., and T. Batchelor.—"Elecric tumbler-switches." 18787. 22nd June, 1946. (613637.)

Standard Telephones & Cables, Ltd., and A. H. Roche.—"Arrangements for switching amplifiers used in high-frequency electric communication circuits." 18855. 24th June, 1946. (613642.)

Standard Telephones and Cables, Ltd., and A. J. Maddock.—"High-frequency heating equipment." 18856. 24th June, 1946. (613643.)

M-O Valve Co., Ltd., A. B. Cutting and G. W. Warren.—"Electron multipliers." 18858. 24th June, 1946. (613644.)

General Electric Co., Ltd., A. B. Cutting and G. W. Warren.—Electron multipliers." 18859. 24th June, 1946. (613645.)

British Thomson-Houston Co., Ltd.—"Stabilization of halogenated hydrocarbons." 18882. 26th June, 1945. (613649.) "Coating and impregnating compositions." 18883. 26th June, 1945. (613650.)

R. S. Ely and I. M. Ketcham.—"Electric heating elements, particularly applicable to de-icing." 18906. 24th June, 1946. (613655.)

Allmanna Svenska Elektriska Aktiebolaget.—"Multiple-break electric circuit-breakers with parallel-connected resistances." 18953. 31st July, 1945. (613665.)

English Electric Co., Ltd., and F. J. Cowlin.—"Turbines and compressors." 18974. 25th June, 1946. (613667.)

English Electric Co., Ltd., and A. F. C. Sleigh.—"Electrical oscillators." 18975. 25th June, 1946. (613668.)

Sturtevant Engineering Co., Ltd., H. W. Wagner and J. H. Hellyer.—"Electrostatic precipitation apparatus." 18984. 25th June, 1946. (613669.)

Dubilier Condenser Co. (1925), Ltd., and A. E. C. Bennett.—"Electrical condensers." 18991. 25th June, 1946. (613670.)

Philips Lamps, Ltd.—"Circuit arrangements for starting gasfilled-discharge tubes." 19074. 20th November, 1939. (613679.) "Devices comprising a high-pressure metal-vapour discharge tube and a reflector." 19076. 30th October, 1939. (613680.) "Circuit arrangements for the amplification or frequency-transformation of electrical oscillations." 19079. 16th April, 1942. (613681.) "Electric rectifier circuits for use with buffer batteries." 19082. 18th April, 1942. (613707.)

D. M. Mackay and C. S. Wright.—"Time base generators." 19089. 26th June, 1946. (613682.)

South Wales Switchgear, Ltd., and H. V. Rose.—"Electrical switching apparatus." 19119. 26th June, 1946. (613687.)

General Electric Co., Ltd., and E. W. Collett.—"Variable equalizers for signal transmission systems." 19128. 26th June, 1946. (613709.)

Radio Corporation of America.—"High-frequency heating systems." 19135. 26th June, 1945. (613688.)

P. R. Mallory & Co., Inc.—"Primary electric cell." 19150. 26th June, 1945. (613711.)

E. A. Marsden.—"Combined wireless receiving sets and table lamps." 19156. 26th June, 1946. (613712.)

Ekco Products Co.—"Vegetable masher and method of making the same." 19222. 22nd December, 1945. (613700.)

Rauland Corporation and C. S. Szegho.—"Methods of coating electrodes of electron-discharge tubes." 19355. 28th June, 1946. (613727.) "Cathode-ray tubes." 19356. 28th June, 1946. (613891.)

Standard Telephones & Cables, Ltd.—"Apparatus for and method of manufacturing of low-capacitance cables of the wheel spoke type." 19412. 28th July, 1945. (613733.)

Akt.-Ges. Brown, Boveri & Cie.—"Blades of turbines and compressors." 19435. 13th August, 1945. (613734.)

Murex Welding Processes, Ltd., and E. C. Rollason.—"Welding of aluminium bronze." 19451. 28th June, 1946. (613737.)

Landis & Gyr Soc. Anon.—"Toggle-spring electric switch." 19454. 11th July, 1945. (613738.)

Sadir-Carpentier.—"Radio and other transmitting and receiving systems." 19468. 31st October, 1941. (613741.)

A. Subkis—"Electric adaptor connectors." 19477. 29th June, 1946. (613742.)

Cardox (Great Britain), Ltd., and T. A. Shimmin.—"Electric connectors." 19566. 1st July, 1946. (613750.)

Standard Telephones & Cables, Ltd., R. M. Barnard, J. H. Fearon and W. A. L. Smith.—"Electric condensers." 19740. 2nd July, 1946. (613772.)

A. Abbey (Eitel-McCullough, Inc.).—"Electrodes for use in electron tubes." 19794. 2nd July, 1946. (613779.)

Compagnie Générale d'Electricité.—"High tension electric cables." 19951. 25th February, 1944. (613797.)

C. W. H. Leathwood—"Electromagnetic switch for lift and other gates." 19972. 4th July, 1946. (613799.)

British Thomson-Houston Co., Ltd.—"Lamp sockets for tubular electric-discharge lamps." 22076. 28th July, 1945. (613894.) "Lamp sockets for electric-discharge lamps." 22364. 28th July, 1945. (613895.)

1947

General Electric Co., Ltd., and A. S. Gladwin.—"Repeater systems for high-frequency electric waves." 17581. 21st January, 1946. (Divided out of 613854.) (613902.)

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—BRISBANE.—31st March. (Date extended.) City Electric Light Co., Ltd. Twenty 500-kV indoor, oil-cooled, three-phase transformers. (E.P.D. 43456/48. Ten/8A.)*

Bath.—12th January. Education Committee. Electrical installation in new infants' school, Moorlands estate. (See this issue.)

Derby.—31st December. Omnibus Committee. V.h.f., f.m. radio equipment. (17th December.)

Egypt.—CAIRO.—18th January. Egyptian Ministry of Public Works. Diesel generating station, three electric pumping stations and 33-kV transmission line. (E.P.D. 44059/48. Ten/30.)*

The time for the receipt of tenders for the erection of the 25,000-kW power station at Talkha has been extended to 15th January, 1949. (E.P.D. 32587/48. Com/1013A.)*

Manchester.—12th January. North-Western Electricity Board. Electric water heaters for twelve months ending 31st January, 1950. (See this issue.)

Pakistan.—KARACHI.—3rd January. Department of Supply and Development. Four 5,000-kW hydro-electric generating units for the Dargai power station. (E.P.D. 41985/48. Ten/35.)*

21st January. (Date extended.) Five turbo-alternator sets and associated boilers. (E.P.D. 41982/48. Com/1281A.)*

Romford.—17th January. Corporation. Electrical installation in 120 two-storey flats. (17th December.)

South Africa.—JOHANNESBURG.—27th January. South African Railways and Harbours. 300-A motor-driven portable electric welding machines and accessories. (E.P.D. 44174/48. Ten/59.)* 1st March. Boiler Plant (E.P.D. 44041/48. Ten/47.)*

Uruguay. — MONTEVIDEO. — 17th January. Usinas Electricas y Telefonos del Estado. 170,000 metres lead-covered twin-core telephone cable and accessories. (E.P.D. 43988/48. Com/62.)*

West Hartlepool.—Town Council. Electrical installations in new houses; borough architect, Municipal Buildings.

*Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

London.—L.C.C. Accepted. Electrical installation at Upper Hornsey Road School, Islington. —Etna Lighting & Heating Co., Birmingham.

CAMBERWELL.—Borough Council. Recommended. Installation of fluorescent lighting at the Nunhead and Livesey libraries (£331).—Thorn Electrical Industries.

Lowestoft.—Corporation. Recommended. Installation of cookers and wash boilers in Orlit houses on No. 1 housing estate (£1,203).—Piggott Electrical Co., Beccles.

Middlesbrough.—Education Committee. Accepted. Rewiring and refitting electric lighting instalation at St. Mary's R. C. School (£774); Watson and Coates.

Newcastle-on-Tyne.—Hospital Board. Accepted. Electrical installation in the Mount Pleasant Maternity Home, Northallerton (£1,320).—Graham Brothers.

Portland.—U.D.C. Accepted. Electrical installations in 16 houses, Pound Piece estate (£609).—Tilsed Bros., Weymouth.

Stockton-on-Tees.—Town Council. Accepted. Electrical installation at the new Darlington Lane Junior Mixed School (£2,041).—H. G. Sproates.

Sunderland.—Education Committee. Accepted. Improvements to electrical installation at Bede Grammar School (£320).—North-Eastern Electricity Board.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Accrington.—Central omnibus station; H. Sanderson, borough surveyor, Town Hall.

Baschurch (Salop).—Conversion of Walford Hall for use as agricultural institute and college; county architect, 5, Belmont, Shrewsbury.

Bolton.—Alterations and additions to Sunnyside Mills for Tootal, Broadhurst Lee & Co., Ltd.; J. Dickinson & Co. (Bolton), Ltd., builders, Fairclough Street.

Buxton.—Rebuilding Earl Sterndale Church for parochial council; Rev. T. H. Miller, vicar.

Cheshire.—Primary school, St. Leonards; A. G. Chant, county architect, 5, Belmont, Shrewsbury.

Chesterfield.—Houses (18), Wingfield Road, New Tupton, for R.D.C. (£28,243); Smith, Hanwell & Sons, builders, Calver, Derbyshire.

Chippenham.—Permanent houses (62), Greenway Lane; borough engineer, 10, Market Place.

Coventry.—Houses (463) and shops, Tile House Lane and Torrington Avenue; D. E. E. Gibson, city architect, 1a, Warwick Row.

Cross Heath.—Married Officers' Quarters at Drill Hall for Staffs T.A. and A.F. Association; Wood, Goldstraw & Yoarth, architects, Victoria Chambers, Tunstall.

Didsbury.—Research laboratories, conference hall and offices, Kingston Road and Wilmslow Road, for British Cotton Industry Association; H. S. Fairhurst & Son, architects, 55, Brown Street, Manchester, 2.

Durham.—Houses (110) for City Council (£120,590); Cussins (Contractors), Ltd., Jesmond, Newcastle-on-Tyne.

Ealing.—Flats (32) and 12 old people's dwellings, South-East Northolt; C. W. Seddon, borough engineer, Town Hall, W.5.

Eton.—Conversions and adaptations at Sefton Park Mansions, Stoke Poges, for Council Offices (£31,284); surveyor, Rural Council Offices, Windsor Road, Slough.

Gateshead.—Flats in Duncan Street, Moore Street and Camperdown Street; S. R. Finn, estate agent, South Shields.

Gosforth (Northumberland). — Permanent library; U.D.C. surveyor.

Grimsby.—School, Yarborough (£84,639); F. A. Would, Ltd., builders, 25, Old Market Place.

Henley-on-Thames.—Traditional houses (42) on five sites; clerk, 12, Hart Street.

Irlam.—Oil refinery and plant at margarine works, off Liverpool Road, for Co-operative Wholesale Society, Ltd.; Architects' Department, C.W.S., Ltd., Balloon Street, Manchester.

Jarrow.—Houses (150) to be built during 1949; borough engineer.

Lancashire.—Junior and infants' school, Alder Park, Winton, and college, near Broad Oak, Accrington; G. Noel Hill, county architect, County Offices, Preston.

Leeds.—County primary school, Iveson estate; Gribbon & Foggitt, architects, 3, Park Lane.

Llandovery.—Permanent houses, King's Arms Road site; town clerk.

London.—BATTERSEA.—Block of offices, Church Road; J. E. G. Green, architect, 262, New Malden Road, New Malden.

HAMPSTEAD.—Flats (80), West End Lane, for T.C.; E. B. Glanfield, architect, Raymond Buildings, London, W.C.1.

Luton.—Factory extensions; Vauxhall Motors, Ltd., Eaton Green Road.

Malvern.—Municipal theatre for U.D.C. (£25,000); M. Wildsmith & Son, builders, Malvern Link.

Manchester.—Extensions to Crumpsall Vale Works for Imperial Chemical Industries, Ltd.; Architects' Dept., Hexagon House, Blackley.

Reinstatement of offices, Hanover Street, Redfern Street and Dantzic Street; Architects' Dept., Co-operative Wholesale Society, Balloon Street.

Mansfield Woodhouse.—Houses (38), Cox Lane, for U.D.C.; Whiteheads (Public Contractors), Ltd., Cedar Road, Mansfield.

Middlesbrough.—Houses (540), Beechwood site; borough engineer.

Morpeth.—Houses (50), Broomhill, for U.D.C.; Mauchlen & Weightman, 12, Saville Row, Newcastle-on-Tyne.

Newcastle-on-Tyne.—Houses (156), Montague housing estate, for the City Council; Cussins (Contractors), Ltd., Moor Court, Gosforth.

Newcastle (Staffs).—General stores, Clayton Road, for Silverdale Co-operative Society, Ltd.; secretary, Crown Street, Silverdale.

Newton Abbot.—Houses (108), Buckland estate; surveyor, 18, Devon Square.

Newton Heath.—Extensions to foundry, Oldham Road Matthew Swain, Ltd.; J. Gerrard & Sons, Ltd., builders, Swinton.

Northallerton.—Twelve farm workers' houses; R.D.C. surveyor.

Prestwich.—First contract in connection with 360 dwellings, Carr Clough scheme; J. T. Kilner, borough engineer, Town Hall.

Salford.—New police headquarters, The Crescent; W. Albert Walker, city engineer.

Smethwick.—Works extensions, Bearwood Road; British Pens, Ltd.

South Shields.—Bus station near railway station, with underground passages (£26,000); J. Reid, borough surveyor, Town Hall.

Spennymoor.—Houses (38) for U.D.C. (£64,518); G. M. Pearson, Ltd., Hetton-le-Hole, Durham.

Stockport.—Branch libraries, Gorton Road and Thornfield Road; W. F. Gardner, borough surveyor.

Stone.—Houses (20), Barlaston, for R.D.C. (£26,624); Morgan Building Co., Birmingham.

Stretford.—Houses (208), Moss Park, and flats (64), Barton Road; A. H. Perry, borough surveyor.

Swindon.—College at the Lawn (£500,000); F. I. Bowden, county architect, County Offices, Trowbridge.

Tettenhall.—Permanent houses (84), Woodhouse estate; J. W. Mason, U.D.C. surveyor, Council Offices, Tettenhall, near Wolverhampton.

Urmston.—Houses (34) and flats, Woodsend estate, Flixton, for U.D.C.; J. Maunders & Sons, Ltd., builders, 554, Barton Road, Stretford.

Warrington.—Houses (31), Dallam Farm estate, for T.C. (£35,657); J. R. Ashal, Ltd., builders, Manchester Road.

West Gorton.—Factory, Gorton Road, for Long & Crawford, Ltd.; Wild & Moss, architects, 72, Bridge Street, Manchester, 3.

West Hartlepool.—Houses (200), Seaton Lane estate, etc.; S. M. Richmond, borough architect, Muncipal Buildings.

Wigan.—Police houses (42); D. M. McKennen, borough engineer.

York.—Branch library, Front Street, Acomb; C. J. Minter, city engineer, Guildhall.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from 15th December:—

TORQUIL. No. 663,888, Class 9. Electric control apparatus included in Class 9, and electric switchgear.—Igranic Electric Co., Ltd., Elstow Road, Bedford.

PRINTOMAX. No. 665,536, Class 9. Electrically operated measuring apparatus, recording meters, electrically operated controlling apparatus included in Class 9 for heating installations, checking (supervision) apparatus, indicating apparatus for inspectional control, coin-freed apparatus and calculating machines.—Landis & Gyr A.-G., Gubelstrasse, Zug, Switzerland. Address for service: D. Young & Co., 29, Southampton Buildings, Chancery Lane, London, W.C.2.

PECOPYROBAN. No. 665,943, Class 9. Fire indicating instruments or apparatus.—P.E.C.O. (Electrical Contractors), Ltd., 3, Charlotte Street, Manchester.

COMOC. No. 666,518, Class 9. Electrical apparatus and instruments included in Class 9 and wireless apparatus.—Communication Components, Ltd., Marrowbone Lane, Dublin. Address for service: c/o the Plessey Co., Ltd., Vicarage Lane, Ilford.

MANTIS. No. 667,504, Class 17. Electrical insulating materials.—Mantis Polish Co., Ltd., 93, Upper Richmond Road, Putney, London, S.W.15.